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ILLUSTRATIONS.

New Buildings, Brighton College.—Mr. T. G. Jackson, Architect 796-797
Chapel, King's College, Aberdeen University: Door in Screen, and Sketch of Canopies of Stalls.—Measured and Drawn by Mr. J. C. Watt 800, 801
Plans and Elevations of Chapel and Tower, King's College, Aberdeen University.—Measured and Drawn by Mr. J. C. Watt 804, 805
Sculpture at the Royal Academy: "Play."—By Mr. S. Fry 808
Grotesques at Notre Dame, Paris.—Drawn by Mr. Reginald T. Blomfield 809
Polytechnic School, Charlottenburg: Portion of Exterior, and Principal Staircase 811

CONTENTS.

Badges and Bearings of Interest and Fame 785
Pumps for Contractors' Purposes.—By M. Powis Bale 786
The Library of Eumenes at Pergamos 787
Notes 788
The Inventions Exhibition: Prime Movers.—II. 789
Letter from Paris 791
The Metropolitan Drainage Outfalls 792
Architectural Societies 792
Surveyorship Items 792
The Architectural Association 793
An Artistic Law Case at Siena 794
Brighton College 794
King's College Chapel, Aberdeen 794
Sculpture at the Royal Academy: "Play," by Mr. S. Fry 794
Grotesques from Notre Dame, Paris 794
Obituary 794
The New Polytechnic School at Charlottenburg, near Berlin (Illustrated) 811
Architectural Association.—Excursion to Crawley 812
Archæological Societies 812
Portland Cement: Society of Engineers 812
Magneto-Inductor and Bridge for Testing Lightning Conductors 812
Cheap, if not Expeditious, Building: Cordery v. Betting 814
The Architectural Association 814
Compensation Case: Universal Marine Insurance Company v. The City Commissioners of Sewers 814
Curves of Contrary-Flexure 814
Italian Silver-Grey Slates 814
The Paragon Theatre, Mile End-road 815
Provincial News 815
Church-Building News 815
The Student's Column: Descriptive Geometry.—Part II. 816
Recent Patents 816
Recent Sales of Property 817
Meetings 817
Miscellanea 817

Badges and Bearings of Interest and Fame.

NEVER first and foremost on the long and glorious roll-call of the chivalry of the Middle Ages, investing history with all the charm and glamour of poetry and romance, appearing to us as a creation from Spenser's "Fairy Queen" rather than a veritable warrior incarnate, the hero of our youth, and the admiration and wonder of maturer years, the very embodiment of daring and adventure, we hail "The Red Cross Knight," with his white coat of arms charged with the crimson emblem of our faith.

Familiar as these grand old arms will be to every one, we must just note that the Templar's cross ends in eight points, differing therein from that of St. George, which is carried through to the borders of the shield and shows no points. The renewned banner of these guardians of the Temple was their "Beauseant," black in the upper half and white in the lower, and it is generally understood that this signified their fierceness to foes and graciousness for friends.

They bore two badges, the "Agnus Dei" carrying the Red Cross banner, and a horse with two knights on his back; this latter was typical of their *poverty* when first instituted (a state from which they soon passed to acquire great wealth), and Boutell mentions the curious fact that the "Pegasus" of the Barrister Templars of the present day is derived from it, the two riders having been mistaken for wings.

The order was finally abolished in the year 1312, after an existence of some two centuries, and its overthrow was accompanied by the most frightful cruelties; and perhaps this persecution has made the Red Cross heroes the dearer to us. They were accused of the most absurd and horrible crimes, but the acquisition of riches undoubtedly led to their suppression and a general scramble for the plunder. Whatever faults may attach to the Templars, they will ever remain a conspicuous and romantic feature of historic fame, and may we not say (slightly varying Pope),—

"If to their lot some human errors fall,
Look on their shield and you'll forget them all"?

But as the "Red Cross Knights" fade from our view, there arise before us their brothers in arms bearing the "white cross," the banner of the "Knights of St. John of Jerusalem," a bearing at least equal in renown, but perhaps not so popularly known as the one we have been discussing.

These "Hospitallers" were founded as an order in the last decade of the eleventh century (about the year 1092), and their white cross is also of eight points, and now familiar to us as the "Maltese Cross," from the knights having settled in Malta in 1530. It was borne upon a black ground. The order was suppressed in England in 1559.

We learn from history (and we learn it with the greatest reluctance and regret) that quarrels broke out between the bearers of the red and white crosses, which culminated in a pitched battle in 1259, from which conflict scarcely a Templar was left to tell the tale. Would that this dark page could be for ever torn from the records of these famed champions of Christianity; but our paper is an *heraldic* one, and we must not linger too long on history even of such deep interest as this is.

It seems "a far cry" from the crosses of our Crusaders to the next important bearing; but "The Bear and Ragged Staff" of the Warwick family has played a conspicuous part in our country's annals, and has furthermore been immortalised by Shakspeare. It is said to have been derived from the Nevilles and the Beauchamps. The origin is dubious, and goes back to "The Round Table" of King Arthur.

A most historic and interesting augmentation is to be found on the arms of the Duke of Norfolk, representing a Scottish demi-lion rampant pierced through the mouth by an arrow, and thus recording the disastrous defeat sustained by James IV. at Flodden, and the finding of the king's body after the fight pierced with arrows. This charge was granted to the Earl of Surrey, who was in command of the English army on that occasion.

The arms of the City of London is a white shield charged with the red cross of St. George, and in the first quarter is a red sword. The cross of St. George is said to be the most ancient of all the numerous crosses of heraldry. The sword in the City arms is a matter of dispute; one side claiming it as an augmentation granted to Walworth for striking down the insurgent Wat Tyler, while others say it was given to Philpot, who followed up the blow by despatching the rebel with his sword; but it is also thought that the emblem of St. Paul is the charge in question,—a solution that seems the more feasible of the three supposed sources, and the one that we prefer to believe.

The arms of Jerusalem are interesting partly from its being an infringement of the rules of English heraldry that "metal shall not be placed upon metal"; upon a silver shield is charged a gold cross between four crosslets of the same (said to symbolise the five wounds of our Saviour), and conveying an allusion to the thirteenth verse of the sixty-eighth Psalm, "Though ye have lien among the pots, yet shall ye be as the wings of a dove covered with silver, and her feathers with yellow gold."

Amongst coats of arms innumerable, some of them of great beauty and very appropriate to their purpose, there is nothing more beautiful nor more happy in its adaptation than the arms of the Sees of our Australasian colonies, the shield being charged with the four stars forming the constellation known as "The Southern Cross," and to most of us dwellers in the northern hemisphere known by hearsay only. We believe that this arrangement of the stars adorns the walls of the mortuary chapel of Bishop Selwyn in Lichfield Cathedral, with other references to his missionary life at the Antipodes.

For pathos we know of nothing more touching than the motto of the unfortunate Courtenays, a noble family of Devonshire,—"Ubi lapsus, quid feci?" "Whither have I fallen, what have I done?" Such was their reward for devotion to the house of Lancaster.

The crest of the Dudleys of Northamptonshire was a remarkable one, and it was the result of a most remarkable event. It appears that one of the family had some dispute with a neighbour over a piece of land, and it was decided that they should "fight it out" as to which was the lawful owner. On the day appointed for the combat the Dudley ancestor was too ill to attend, but his daughter armed herself, and met the neighbour, and, after a stiff encounter, overthrew him; and for this exploit was assumed a woman's bust rising from a ducal coronet, with hair dishevelled, bosom bare, and a helmet on her head. The name of this amazon was Agnes Hotot.

Sir Cloudesley Shovel, the great admiral of Queen Anne and William III., had a special grant of arms from the latter monarch, blazoned as follows: "Gules, a chevron ermine between two crescents in chief argent, and a fleur-de-lys in base or." The two crescents are to commemorate two memorable victories over the Turks, and the fleur-de-lys one over the French. Lower, in his "Curiosities of Heraldry," pronounces this to be one of the most appropriate coats he had ever met with.

As a sample of the bad taste often displayed in arms alluding to the profession or pursuits of the original bearer, Lower gives the instance of Bishop Hooper, of Gloucester and Worcester, the champion and martyr of the Protestant faith (whose statue is to be seen at the former place, adjoining the cathedral), who bore "a lamb in a burning bush, the rays of the sun descending thereon proper."

Of all extraordinary "supporters," the same

authority mentions two lawyers as chosen for that purpose by Sir George Gordon, a celebrated jurist, and the first Lord Aberdeen, and adds, "Every man to his taste."

The Stanley crest of "the eagle and child," born by the Earls of Derby, is a remarkable one, with a legend attached to it of the king of birds having taken an abandoned infant to its nest out of kindness, where it was discovered alive and well fed; but the story does not hold water, and many different versions are given. The crest itself is well known and frequently met with, and Cussan mentions having come across it as a public-house sign in the hamlet of Whitwell in Hertfordshire, and thereby finding out that the Stanleys had, at one time, been possessors of the manor, and although it had been some three centuries ago, local tradition had thus preserved this memento of the family, and he adds, "I only adduce this instance to show how extended are the historical lessons which may be learned by even a superficial knowledge of armoury."

At the interesting church of Elford, in Staffordshire, we meet with this Lathom crest (as it is at times called) with a singular effigy of "The Stanley Boy," with the fingers of the right hand raised to the temples, and the left hand holding a tennis ball, the inscription "Ubi dolor, ibi digitus" (where the hurt there the hand), thus showing the cause of his death.

The Lanes of King's Bromley, Staffordshire, bear an historic and royal augmentation for the devotion of the family to Charles II., whose life was probably saved by Jane Lane after the battle of Worcester; it consists of the royal arms on a canton added to the original shield, and for a crest "a strawberry horse bearing between his fore legs the royal crown."

Some of our Welsh neighbours are profuse in their numerous quarterings; the Lloyds alone have thirty-five, according to Ellen J. Millington, some going back to Edward I.'s reign, and an enumeration of a few of them is not very pleasant reading. The first, for instance, has "a chevron between three *dead Englishmen's* heads in profile, couped and bearded proper"; and the second "a Saracen's head erased at the neck proper." The crest is "a dead Englishman's head in profile, couped and bearded.

For this selection of a Welsh coat we are indebted to the lady above-mentioned, in her work entitled "Heraldry in History, Poetry, and Romance."

The arms of Shakspeare, granted to the father of the immortal poet, are of the allusive or punning order, and the blazonry is "Or, on a bend sable, a spear of the first," and the crest, "a falcon grasping a spear," is a very pretty one.

Chaucer has for crest a tortoise, and the arms are "Party per pale argent and gules a bend counterchanged."

Sir Walter Scott's crest was a woman holding a golden sun in one hand and a silver crescent in the other, the motto being: "Reparabit cornua Phœbe." His coat contains crescents and mullets or stars, with buckles and mascles.

We close this all too scanty sketch for such a comprehensive subject with the following extracts, the first from the preface to that most charming and valuable work, "Moule's Heraldry of Fish" (so beautifully illustrated by his gifted daughter), and the second from that rare and far-reaching research of Lower, and entitled "The Curiosities of Heraldry."

"To the architect heraldry affords an unlimited extent of enrichment in exterior sculpture; and the judgment of C. Barry, R.A., the architect of the House of Lords, has admitted it as an important feature in the principal façade of that splendid edifice. The introduction of arms in windows and pavements also renders it necessary that the architect should be acquainted not only with the rules, but with the peculiar character of the heraldry of different periods."

"The architect who should attempt to raise some stately Gothic fane, omitting the well-carved shield, the heraldic corbel, and the blazoned grandeur of 'rich windows that exclude the light,' would inevitably fail to impart to his work one of the noblest charms possessed by that noblest of all styles of building, and produce a meagre, soulless abortion."

If we cannot quite endorse this rather too sweeping conclusion, we can at any rate feel, with the enthusiastic writer of it, that heraldic distinctions form not only a most interesting, but a most picturesque and poetic manner of defining the historic relations of buildings and of those who have erected and inhabited them.

PUMPS FOR CONTRACTORS' PURPOSES.

BY M. POWIS BALE.

It cannot be denied that much annoyance and loss often arise through want of knowledge or judgment in the selection of a pump of a type best suited to the requirements of the user. We purpose giving here a few notes on the pumps we consider more especially adapted for contractors' purposes, with some general hints as to working and the points of construction to be desired in them.

In selecting a pump the features to secure, as far as possible, are simplicity, strength, and easy access to the working parts. Pumps of somewhat complex construction are in use which give high results theoretically, but, as a rule, these are rapidly counterbalanced by the extra cost of renewals, breakdowns, &c.

Where very large quantities of water have to be raised, as in mines, the Cornish or beam pumping-engine is undoubtedly the best and most powerful system to employ, but as comparatively few contractors have much occasion to use Cornish engines, we shall not extend our remarks in this direction, but pass to the contractor's pump *par excellence* for low lifts,—say up to 20 ft.,—viz., the centrifugal. For raising considerable quantities of water to a moderate height, it is one of the simplest and most useful forms of pumps made. For lifting water containing foreign matter, sand, leaves, &c., it is much superior to ordinary direct-acting steam pumps, as the steam valves of these latter are very liable to be thrown out of order, or the water ways to become choked. The working parts consist briefly of a series of curved discs or blades, which are made to revolve in a cast-iron case, in a similar manner to a fan-blower. The revolution of these blades produces a partial vacuum in the case, which brings up the water. On the proper proportion and construction of these curved blades the effective working of the pump chiefly depends. Motion is usually imparted by a belt, but a high-speed rotary engine is sometimes coupled directly on to the disc spindle; the great objection, however, to most of these engines is the large amount of steam they consume. For purposes of irrigation, a windmill or horse-gear can be used.

In the most advanced form of the smaller centrifugal pumps the main body of the pump is attached by a quadrant bracket to the bedplate. It can thus be readily swivelled round to any angle it may be desired to work at. This arrangement will be found very convenient for foreshore work, or in awkward situations. At the same time the joints of the suction or discharge pipe need not be disturbed.

The casing of the pump should be arranged so that one side may be taken off to allow of the inspection or cleaning of the pump disc, and hand holes arranged with bayonet-jointed covers, fitted on either side of the suction-pipe, so that any obstruction may be readily removed. To dispense with the use of a foot valve and to save the trouble of charging the pump with water by hand, a small air-exhauster can be fitted and driven from the main-pump disc spindle by a belt. A clack valve being fitted to the end of the discharge-pipe, the air is readily exhausted from the pump and pipes and the pump charged with water. The foundation-plate should be cast in one piece, the bearings be of ample area, and efficient means of lubrication secured. For the general purposes of a contractor these pumps are not surpassed by any other, bearing in mind their simplicity of construction, little liability to disarrangement, and low first cost. Rotary pumps have also the advantage of great certainty in working. Wrought-iron suction-pipes are preferable to cast as they are lighter and less liable to breakage. It will be found convenient for surface drainage and such like work to mount the pump on two wheels; if, however, it can be fixed below the source of supply it will work better, as it does away with the suction. A pump of ample capacity for the work to be performed should be employed, and a broad flexible leather or India-rubber band should be used for driving. It is important that care be taken that the pump is made to run at its proper working speed, which will vary according to the height of the lift.

Another extremely useful pump for contractors' use is the chain. This is of simple construction, and will stand a great deal of rough usage without getting out of order. It is only adapted, however, for raising water to a moderate height, say 50 ft. The pump consists of an endless chain, and discs made to revolve round a wheel mounted in a framing of cast iron. The chain and discs are arranged to pass down into the water, and up through a wooden or iron tube, carrying with them a certain amount of water, which is delivered into a trough or tank at the ground level. This form of pump is well adapted for lifting sewage, and it will lift,—without choking,—sand, mud, leaves, &c. The discs pass up the pipe horizontally, and should have a clearance of, say, $\frac{3}{16}$ in. to $\frac{1}{4}$ in. They may be made of wood, leather, india-rubber, or iron, as may be most suitable to the work.

The discs should be arranged about 10 ft. apart; putting them nearer does not add to the efficiency of the pump. The speed at which the chain is driven will depend somewhat on the nature of the water being lifted, but the speed for general purposes should be about 250 ft. per minute. A slight drawback to this pump is that it has (of course) a certain amount of slip in working, which has been calculated at about 20 per cent.; but this is to a great degree counterbalanced by its certainty of action and low first cost.

For light sinking purposes, owing to the constant liability to flooding, bucket-pumps are largely employed, but where the quantity of water has been pretty well ascertained, barrel pumps may be used with advantage. In selecting a barrel-pump care should be taken that the pump barrel, glands, valves, &c., are of gun-metal, and that covers are provided for their ready examination. For deep sinkings, wooden connecting-rods, clamped with iron, may often be used with advantage. The pump-rods should, in all cases, be arranged with guides, as they work much stiffer, and are less liable to bend or get out of truth. An air-vessel should be fitted to the rising main, as the flow of water is more equal, and the pump is relieved from shocks that may arise. The suction-pipe should have a foot valve and strainer. Very great care should be exercised in fixing the pump-plunger and connecting-rod exactly in a vertical line. Should they be out of plumb the valves will probably soon be broken to pieces. In fact, in one case we have known a valve to be broken to pieces and be brought to the surface with the stream of water.

Hard wood staging to support the pump is perhaps preferable to iron, as it is more readily fixed or renewed. Where pump gear is fixed at the top of a well or sinking, especial care should be taken with the foundations; and that the pump gear is perfectly level and free from vibration in working if it be driven by an engine and belt: the centre of the driving-wheel should be at least 18 ft. off.

There is a great variety of mechanical arrangements for pumping, especially suited to varied circumstances of site, depth, and nature of water, motive-power, &c. For contractors' purposes, where the usage is generally rough and the water not of the cleanest, the complex or delicate forms of direct-acting or reciprocating steam pumps should be avoided; many of them also consume a large amount of steam. Where, however, the water is clean and a large quantity of it has to be raised a considerable height, they are of great value, as this duty cannot be satisfactorily performed by either

the centrifugal or chain pump. It must be premised, however, that they are under skilful management.

In direct-acting pumps the steam valves require careful attention, and are somewhat liable to get out of order; those worked by tappets have the advantage of being rather more reliable than steam-moved valves. With regard to ram pumps the ordinary slide-valve arrangement is to be recommended. To secure steady and even working a tolerably large and heavy fly-wheel should be employed. In all piston pumps it is a matter of the utmost importance to their efficient working that the piston should be perfectly leathered and packed, and, consequently, completely air-tight. Long-stroke steam-pumps are generally to be preferred to short, as there is less change in the direction of the pump-piston, and, consequently, less inertia to overcome; and the water lost through the valves is, practically, the same in both cases. It is important that its motions are properly cushioned, and that it will start at any point of stroke on dead centre. When the pump has to be fixed a considerable distance from the boiler, and where the condensation of the steam in the pipes must necessarily be great, compressed air may be used instead of steam with advantage, although the cost of its production in the first instance is greater than that of steam, probably about 50 per cent. or even more; but, by its use, steam pipes are done away with, also their cost of fixing, flexible hose being used in their place. This is especially valuable when blasting, as the pump may be mounted on a suspended platform or on wheels, and it and the hose moved out of the way when a "shot" is fired. For rough usage we can recommend leather pump-valves and a simple fibrous material, such as hemp for packing, as these can be readily renewed without special skilled labour. India-rubber valves are quite unsuited for lifts above say 250 ft. For contractors' use we prefer to employ, wherever possible, the centrifugal or chain pump, as being better suited to the nature of the work than most of the direct-acting piston-pumps.

For working in difficult situations, or keeping foundations free from water, the pulsometer pump will be found of considerable service, and, as it has no delicate parts, it may be used for raising muddy water, &c., without detriment. It does not require skilled attention, and may be suspended by a chain, and can thus readily be employed to keep water under whilst deep-well or other permanent pumps are being repaired.

When it is necessary to raise water from one level to another, the work being of a temporary character, and it is not desired to go to the expense of a pump, a steam water-raiser or elevator can be used. This little apparatus consists briefly of pipes at right angles to one another for steam suction and delivery. The steam enters at one end, and creates a partial vacuum in the suction and delivery pipes, which will suck up water from a depth of about 20 ft. It can also be used for forcing, and will force water about 1 ft. high for each 1 lb. of steam pressure employed. It is very important that the suction-pipe used be perfectly air-tight, and a rose should be fixed on the end of it.

The disadvantage attending the use of this and other water-raisers and pumps which rely for their action on the formation of a vacuum by means of the steam used, is the loss through the extra steam required to work them, which is very considerable in many cases.

A number of hand-pumps more or less adapted for contractors' requirements are made, and some of these are very indifferent productions. To secure durability and efficiency in working they should in all cases have bored barrels and gun-metal valves and buckets, and a brass lining to the pump barrel is a decided improvement. A wrought-iron pump is much to be preferred to cast, as it is stronger and more portable, and it should be galvanised and supplied with a sliding suction-pipe to suit variable depths. Where water has to be raised from a considerable distance, the working barrel can be taken beneath the ground level, and in lieu of a single handle the pump can be arranged with double lever handles for two or more men to work at. We recommend for these pumps pipes with flanged in preference to screwed joints, and the sliding suction-pipe should be fitted with a galvanised wrought-iron strainer. These pumps are, of course, only suited for small contracts.

All suction-pipes should be well tested, and the joints made perfectly air-tight; much trouble and loss is often caused through the leakage of the air and consequent failure in the working of the pump. In arranging the pipes avoid all bends as far as possible, as the friction of the water through the pipes is largely increased by them. If the pump has to draw above 6 ft. vertically, it would be well to have a retaining valve fitted in the suction-pipe close to the water.

The speed of the water through the pipes should not exceed 250 ft. per minute, as the friction in the pipes increases in the proportion of the square of the velocity. It therefore follows that if pumps are driven at a very high speed a considerable loss of power through friction occurs. When long lengths of pipe have to be used, allowance must be made for friction, and it is therefore advisable to select a pump somewhat larger than is absolutely required for the work.

In long lifts it is very important that the pipe joints should be very carefully made, otherwise with heavy pressures leakages are very liable to occur. It will pay well to have all joint flanges planed. We have seen joints made with a lead ring wrapped round with lamp cotton stand extremely well, but where the head of water exceeds 500 ft., we can strongly recommend the joint as shown by fig. 1. In

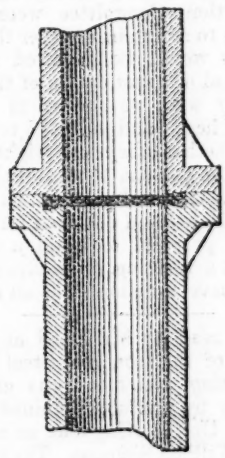


Fig. 1.

this joint the lower pipe is recessed, and the upper one made with a corresponding projection; a cord of gutta-percha is inserted between the flanges, and squeezed flat, when the bolts are tightened up. This joint has stood pressures of upwards of 700 lb. per square inch. Our illustration (fig. 2) repre-

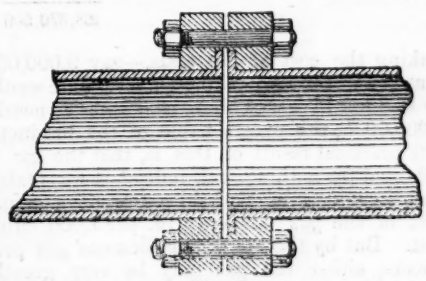


Fig. 2.

sents another joint well adapted for pipes carrying compressed air, as it will be found perfectly tight in working, cheap, and readily fixed. The ends of the pipe are flanged, and an india-rubber washer inserted between them; they are then brought tight together by means of the bolts. These pipes should be made of wrought iron of good quality, so that should it be necessary to replace or joint them, they may be cut at any point, heated, and turned up by a smith, which is an advantage over screwed pipes, as they when cut have to be screwed at the ends to join them; at the same time, the threads of the screws are apt to become worn, and make a leaky joint.

Owing to exigencies of site in using steam pumps it is sometimes necessary to fix the boiler at a distance from the pump, the consequence is there is very considerable condensation in the pipes. This can, however, be greatly modified by covering the pipes with non-conducting material; where, however, there is much water, such as is often met with in sinking operations, a suitable covering is at present not very easy to find. What is wanted is a hose to slip over the pipe and keep the heat in, and be not affected by it on the inside or by the water on the outside. India-rubber hose will keep the water off, but is itself more or less affected after a time by the heat of the pipes.

In lieu of the above, although somewhat troublesome to fix, we can recommend the following as being cheap and effective:—Box up the pipe in a triangular box neatly joined at the angles, and fill in the vacant space with "silicate cotton" or "slag-wool,"—a non-conductor made from blast furnace slag,—which should be rammed tight. Asbestos packing is also very good for this purpose, but more expensive.

We need hardly say that, whatever pump is employed, all bearing surfaces should be well lubricated, and we can recommend the following mixture as giving very excellent results:—Good lard oil, 75 parts; plumbago, powdered very fine, 25 parts. This will be found to put a fine surface on the inside of steam cylinders, and can be used with advantage in most kinds of bearings.

THE LIBRARY OF EUMENES AT PERGAMOS.

THE chief laurels of the Pergamene excavations have rightly been awarded to Dr. Humann, but an aftermath of glory remains for Dr. Conze, who, in his study at Berlin, has discovered the undoubted site of the great library of Eumenes. Archæologists all knew that Pergamos boasted a library of many thousand books, that its fame as a literary city was little behind its repute as a health resort; they knew, further, that it was Eumenes who turned to such good account the "Attalicæ conditiones" of his predecessors; that this same Eumenes "built the city, and out of his love of magnificence and beauty erected buildings as offerings to the gods, and founded libraries and made Pergamon the splendid abode it now is." But though the great altar was brought to light with such great rapidity, the site of the great library, scarcely less famous, has remained until quite recently undetected. At the last meeting of the Prussian Academy of Sciences, Dr. Conze read a paper, in which he proved beyond doubt the exact spot where the library is to be found. His paper is printed in the current "Berichte" of the Academy, pp. 1,259-70. What he maintains is briefly this. Behind the temple of Athene Polias, to the north and to the east, enclosing a considerable space, ran a colonnade two stories high. The arrangement of the colonnade and its position in relation to the temple can be seen in the authorised restoration of the Acropolis. Such alterations as have to be made in this restoration, and which we have noted elsewhere, do not affect the arrangement of the colonnade. Behind the north side of this colonnade run a number of rooms, some in the upper, some in the lower, story. The rooms in the upper story are four in number, and the most easterly one is the largest. Within this room, on the north, west, and east sides, is a low piece of masonry, somewhat like a bench. On the north side it broadens out to the width of a basis large enough to hold a good-sized statue. On this basis originally stood the great statue of Athene, which is now placed with the other Pergamene marbles in the Assyrian Room at the Berlin Museum. It stands at the far end. On the north and east walls, to the inside, have been found a regular series of holes. These, Dr. Conze thinks, contained the hooks on which the shelves for the

books were fastened. The statue of Athene would be very appropriate in such a place,—at least, so Juvenal thought :—

"Hic libros dabit et forulos *mediamque Minervam.*"

An additional proof of the existence of this library is afforded by some inscriptions found within the precincts of the Athene temple ; they originally belonged to portraits of Alcæus, Herodotus, Homer, &c., and had reference to the literary studies that were carried on at Pergamos.

The discovery of this library, and the certainty of most of its architectural conditions, has a special interest, because it enables us to reconstruct in thought other libraries of the ancient world. This Pergamene library consisted of one large room and a number of smaller ones behind a colonnade, very like in arrangement, as Dr. Conze says, to the cells of monks running behind the cloister. Such probably was the form of many of the great libraries at Rome, that of Lucullus, Asinius Pollio, and the like ; such was the library in the Roman forum, and that of Hadrian at Athens ; such was the library at Herculaneum, famous for the papyrus rolls it has preserved. It is right to say that the conjecture so firmly established by Conze had been made before, as he himself is the first to own, by Christopher Belger.

NOTES.

THE next meeting of the Institute of British Architects, on Monday, the 8th, is expected to be a very representative one. The Royal Gold Medal will be presented to Dr. Schliemann, who is coming from Greece especially to receive it. Mr. Charles Barry will present to the Institute the portrait, painted by Mr. Holl, of the late President, Mr. Horace Jones ; and the medals for the Soane Medallion, the Tite Prize, the Institute Medal, and the medals of merit gained in the competition for the Pugin Travelling Studentship. The actual Pugin medal for the year is not presented till after the completion of the student's tour, and the handing in of the sketches made during the tour ; and the same applies to the Godwin Bursary medal. A large meeting is expected.

THE funeral of M. Théodore Ballu, the eminent architect, took place at Paris last week with unusual ceremony. The procession passed from the mortuary, a beautiful little building designed by the lamented artist himself, in connexion with the Church of La Trinité, one of his most important and successful works, to the cemetery of Père Lachaise, where his coffin was placed in the family monument, another work of his own, of charming antique sentiment. The pall-bearers were M. Kaempfen, Directeur des Beaux Arts (representing the Minister of Public Instruction and of the Fine Arts) ; M. Alphand, Directeur des Travaux de Paris (representing the Prefect of the Seine) ; M. Bouguereau, President of the Académie des Beaux Arts ; M. Guillaume, the sculptor, representing the family and friends of the deceased ; M. Bailly, President of the Société libre des Artistes Français ; and M. Questel, President of the Société Centrale des Architectes ; these two last being, like M. Ballu himself, Members of the Institut de France and Honorary Members of the Royal Institute of British Architects. These six delegates pronounced each a discourse. It is sufficient here to mention the eloquent *extempore* speech in which M. Alphand engaged, in the name of the Prefect of the Seine and of the Conseil Municipal of Paris, to proceed as quickly as possible with the completion of the Hôtel de Ville after the designs for the interior decoration left by the deceased.

MR. I'ANSON, the senior Vice-President of the Royal Institute of British Architects, will attend the Congress of French Architects to be held next week in Paris, as the representative of the Institute.

THERE is a hot controversy going on at York in regard to what should be done with the superfluity of ancient churches, for which there appear, from all accounts, to be no sufficient congregations, and a meeting was held at the Corn Exchange, York, last Saturday night, under the auspices of the "Society for the Protection of Ancient Buildings," to protest generally, after the manner of that Society, against everybody and everything. Mr. William Morris addressed to the meeting an eloquent protest against pulling down or removing old churches, and said that if these churches were pulled down "York would be a very commonplace city." On the other hand, a gentleman, Mr. W. H. Hargrove, who spoke in support of the action of the Archbishop in the matter, accused the "S. P. A. B." of having circulated the grossest inaccuracies in respect to the intentions of the Archbishop and the committee acting under him, and of having stated that half the churches in York were to be pulled down, when no such measure was contemplated. We cannot, of course, decide on hearsay report ; we can only say that if the agents of the Society for the Protection of Ancient Buildings have circulated gross inaccuracies, it is exactly in accordance with their conduct on several other occasions, in regard to which we have been in possession of the facts. Not that we believe the Society would deliberately circulate what is not true, but that they are so utterly run mad on their hobby that they cannot wait to ascertain facts. We are taking means to get authentic information, and reserve our judgment till then. The anti-restoration party seem extremely exercised about a meeting held on the Monday after to promote the restoration of St. Crux Church, "when the Restoration Committee were requested to take steps to ascertain whether the promised subscriptions would be renewed for a new church, instead of a restoration of the old one." The meeting went so far as to burke the restoration scheme and vote the return of the money. Whether they are right or wrong depends on the present state and the architectural and practical value of St. Crux Church. If it is dilapidated and unsuited for its present purpose, the proposal to build a new one is exactly what a meeting of Mediæval churchmen would have sanctioned, at all events.

IN a paper read by Mr. Head at the recent meeting of the Iron and Steel Institute, a very interesting statement was given of the values of the by-products obtained at the gas works of the United Kingdom, as compiled by the late Sir William Siemens. They were given as follows :—

Colouring matter	£3,350,000
Ammonium sulphate.....	1,947,500
Pitch (325,000 tons)	365,000
Creosote (25,000,000 gallons)	208,000
Crude carbolic acid (1,000,000 tons)	100,000
Gas coke (4,000,000 tons, after allowing 2,000,000 for consumption in working the retorts), at 12s.	2,400,000
	£8,370,500

Taking the cost of the coals,—say 9,000,000 tons at 12s. per ton,—at 5,400,000*l.*, there would be still left over and above the sum of nearly 3,000,000*l.*, the excess value of the products. The practical result of this is, that the gas is obtained for nothing, and, indeed, it was stated that in a certain Yorkshire town the actual cost of the gas was only 1d. per 1,000 cubic feet. But by the use of the Siemens' gas producers, either the gas may be very greatly enriched or the extraction of tar and ammonia very much increased ; while, in many districts, the coal costs nothing like 12s. per ton, or even half of it. Some of the northern coals are especially favourable for the recovery of sulphate ammonium, varying from 20 lb. to 26 lb. per ton of coal ; and as the value of the ammonium sulphate is about 20s. 6d. per cwt., the recovery of 23 lb. is equivalent to 4s. 2½d. for every ton of coal used in gas producers. Simple folk, who are not manufacturers or proprietors of gas-works, but only compulsory gas-consumers, may, perhaps, be excused for thinking that it would not be unreasonable to hope that some of the very substantial advantages gained by science should come their way occasionally, and that they should participate in the illuminating millennium, either by the reduction in the general price of gas or a very considerable improvement in the quality. Both these things are *desiderata* to the householder.

THE fifth annual report of the executive Committee, and the third annual report of the Committee on the American School of Classical Studies at Athens, give evidence of substantial, though not very striking results. Excavations at Assos were carried on from February to November of the past year. The Agora of the city and the Nekropolis were explored, and the great Baths (of which we gave detailed notice in a past number), the Heroon, and the Stoa. A great number of inscriptions have been copied, a series of photographs made, and, for a time, this was all. The American School succeeded ultimately, however, in coming to terms with the Turkish Government, and an experiment was made by which one-third of the discoveries were to be the property of the excavators. Some important pieces of archaic sculpture have accordingly found a home at Boston, among them a heraldic sphinx from the east end of the Temple of Athene Polias, and a fragment of sculpture representing Herakles contending with Centaurs. The architectural fragments are of great importance for the study of *non*-religious Greek architecture. A full account of the excavations is in preparation by Messrs. Clarke, Bacon, & Koldewey. The cost of the whole undertaking is reported at 19,121 dols. (not much under 4,000*l.*). In the second year of the school the number of students were only two, the directorship held at first by Prof. Goodwin passed into the hands of Prof. Packard. He fell ill, and has had to rely largely on the help of Dr. Stenet. Among the treatises which have been completed by the school are the Assos inscriptions, by Dr. Stenet, and the Erechtheum, by Fowler ; also in connexion with the school, a work by Mr. J. Stillman, on "Prehistoric Walls in Italy and Greece." This work, so ably carried on by America, should rouse in English archæologists a spirit of wholesome emulation.

THE statue of the closely-draped Venus, known as the "Venus Genetrix," has long been a puzzle to archæologists. Several replicas exist, one at Florence, one in Rome, one, the best known, in the Louvre. We are justified, then, in supposing that the original of the type was a statue famous in antiquity. A certain analegy has been noted between the head of this Venus Genetrix, of somewhat archaic style, and the head of the Hippodameia in the Olympian east pediment. Hence, M. Reinach, in publishing a small terra-cotta statuette which reproduces the same type, hazards the opinion that we have in all these replicas an echo of the famous Aphrodite of the Gardens (ἐν κήποις) of Alkamenes. Quite independently, Mrs. Mitchell arrived ("Hist. Greek Sculpture," p. 320) at the same conclusion. Probably both were led to this belief by the fact that the Alkamenes Aphrodite was specially noted for the delicate beauty of the hands. Though the coincidence of opinion is striking, we believe the original type of the Venus Genetrix must be looked for quite elsewhere. Dr. Curtius reminds us of a far more famous Aphrodite, namely, the draped Aphrodite whom Praxiteles made (*velata specie*) for the inhabitants of Cos, the rival of the nude Aphrodite chosen by the Cnidians. Now, it is a significant fact that the terra-cotta replica which M. Reinach publishes comes from the necropolis of Myrina. From this same necropolis have been taken as many as twenty small replicas of the Venus of Cnidos, by Praxiteles, and one of his Ερως : why not then also one of his Venus of Cos ? The almost ostentatiously draped character of the figure lends itself to this attribution. The subject comes up again, owing to the publication (in the *Gazette Archéologique*, 1885, fol. 11) of a small bronze statuette representing this type. It also was found in Asia Minor and is now

the property of M. Lavedorte. Praxiteles types would very naturally be found in Asia Minor, types of the date of Alkamenes scarcely.

THERE is to be found at Piacenza, in a remote quarter of the town, some of the loveliest terra-cotta work in Italy. It is in a cortile, part of the old Palazzo del Tribunale. Only a portion of one side is intact, the remainder having been bricked up between the columns, which are of granite, the caps and bases of stone (the former of beautiful shape). The arches and cornice are terra-cotta, with most delicately-designed ornament. The whole thing is in a lamentable condition. The court-yard is only used as the playground of a few children, and the rooms on one side are converted into stables and water-closets, as any one who pays the place a visit will soon discover, that is to say, if he is in possession of what the Italians do not seem to have,—a nose.

M. ROY'S excavations near Tunis, which for some time past he has privately carried on, have been rewarded by a considerable measure of success, both as regards architecture and sculpture. He has brought to light the peristyle of a large building, and within its precincts has found several marble statues of large size. M. Roy proposes to publish his discoveries in the "Bulletin Trimestriel des Antiquités Africaines," for the appearance of which we must wait for further particulars.

BY order of the Victorian Government a large scheme for irrigating the Tragowel Plains from the River Loddon has lately been investigated. The area to be watered amounts te 238,000 acres, and the project is estimated to cost 164,588*l.*, or nearly 442*l.* per square mile, or equal to 12s. 6½d. per acre. If to this be added 7½ per cent. for interest and sinking fund, and assuming the working expenses at the rate of 3,500*l.* per annum, the annual cost per acre would be 4s., allowing one-third of the entire area being irrigated each year. The channels designed for the scheme will, when running full, discharge 330 million gallons, or 48 million cubic feet, in twenty-four hours, with which volume it is calculated a depth of 6 in. may be distributed to 80,000 acres,—one third of the entire area,—in thirty-six days.

JUDGING by the description given of New Caledonia, its soil must be a veritable mine of mineral wealth, but for agricultural purposes, it is said, it will not produce more than sufficient for the wants of the country itself. Of metals, however, it apparently possesses the greatest variety, there having been found up to the present time gold, silver, nickel, copper, cobalt, chrome, antimony, iron, and galena. Not a tenth part of the country has yet been prospected, but 485,000 acres have already been bought or leased. Nickel is the most plentiful of all the minerals, being found nearly everywhere, and after many fluctuations in commercial speculations, it has become the basis of the colony's industry, and on it its whole future depends. Up till now, however, the progress of the colony has been very slow,—a fact which it is somewhat difficult to reconcile with its reported valuable mineral capabilities.

WE quote from the Berlin *Philologische Wochenschrift* the report of a discovery which, if it be true, is of the greatest interest. But we are bound to say that the *Wochenschrift* itself expresses grave doubts, which we freely endorse. From Carnuntum, in lower Austria, comes the news that a fragment of painted pottery, apparently a piece of a Greek vase, has been discovered, and the design represents nothing less than a careful reproduction of the famous Hermes of Praxiteles. Archæologists have been busy about conjectural restorations of the group, — the restoration makes Hermes hold a bunch of grapes in the right hand. A small statuette, embodying this trivial, and we think impossible, motive is to be constantly seen, to our great regret, at the British Museum, where it doubtless misleads countless visitors. A far more simple and congruous restoration gives Hermes a long caduceus in the right hand. This view has been supported with much learning, and a long catalogue of analogous monuments, by Mr. A. H. Smith, in the *Hellenic Journal*. The reputed vase fragment supports neither view,—it places in the missing hand a thyrsos. Such a restoration would be very satisfactory. We repeat, however, that we fear the reputed "find" is too good to be true. The fragment, true or false, has passed into the hands of Dr. Rollet, of Baden. If genuine, it will no doubt be speedily published.*

THE discoveries of the last few years, both at Sparta and Delos, have led most archæologists to the conclusion that many of the peculiarities of early archaic sculpture are due to its derivation from a previous wood technique. Dr. Brunn, in a paper on "Tectonic Style" in the *Sitzungsberichte der Bayerischen Akademie der Wissenschaften*, seizes upon this notion, and in his usual suggestive original fashion applies the principle much more widely than its original advocates conceived of. Early sculpture was dependent for its existence on the softer material, wood, and long after stone had come into use the traditions of a woodworking school prevailed. In the sculptures of Assyria, where, as it seems, from the outset soft stone was chosen as the material, we see no such influence, and in Asia Minor schools, which seem to have depended a good deal on Oriental tradition, we see very little trace of anything of the sort. It is in the Peloponnesian school, with its square, thick-set character, its absence of rounded surface, and flowing line, that, according to Dr. Brunn, the influence of the post and beam and the plank of the early wood images (*xoana*) is most apparent.

THE excavations of the French at Nemea during the past year have resulted in nothing of importance. Better fortune has attended their work in Elatea. Close to the remains of the temple they have found a basis inscribed with the name Athene Kranaia, thus fixing with certainty the already presupposed dedication. Outside the sacred precincts have been found also many fragments of vases and painted architectural remains. Inside the temple a number of fragments of sculpture were brought to light, and some vases inscribed with artistic names, Ergophilos and Polykles, also a number of inscriptions, including a long decree. To the north of the temple were found a number of fragments in bronze and terra cotta.

THE "Εβδομας (No. 51) publishes in a rough woodcut a recently-discovered gem, on which is engraved a design representing a male figure sunk upon his knee. The figure bears on his back the winged love-god. In the "Anthology" (ii., 255, 4) there is a somewhat vague description of a statue of Herakles by Lysippos, in which the hero is represented stripped of his arms and lion-skin, and tamed by love :—

"τίς δέ σ' ἔπερσεν
ὁ πτερόεις ὄντως εἰς βαρὺς ἄθλος Ἔρως."

It is just possible that we have in this gem an echo of the statue of Lysippos. We know so lamentably little of this sculptor that every scrap, even of inference, as regards his style is precious.

THE Architectural Association seem to have had a pretty sharp fight on the question of raising their subscription from half a guinea to a guinea, at their last meeting, and adjourned the consideration of the subject. We print a letter from Mr. Sedding about it in another column. The step is rather a serious one. The strength of the Association has been in numbers and in the valuable and practically almost gratuitous architectural education they have afforded to many poor students. We understand, however, that it is contemplated that if the raising of the subscription is carried, a great advance will be made in the educational scheme, and the services of learned lecturers and Professors will be obtained towards this end.

ON the north side of the magnificent Church of Santa Croce, in Florence, there is an arcade which was originally part of the church, but which has for some years past been tenanted by carpenters and small shopkeepers. These have all been cleared away, and it is purposed to form a loggia nearly the whole length of the nave. This ought to be a great improvement. It will, however, very largely increase the stock of beggars at present attached to the church. Hitherto, there being no porch, they have not been so numerous as in most well-ordered churches. When the new loggia is completed, however, it will form a nice shady place for these pests to lay in wait for the unwary traveller.

WE are glad to learn from the Athenian correspondent of the *Athenæum* that Mr. Penrose is engaged in further researches there, on the site of the Temple of Jupiter Olympius, a work which he is undertaking on behalf of the Society of Dilettanti.

THE mosaic of Lillebonne, to which we referred the other day, purchased in 1879 for about 1,000*l.*, taken from Lillebonne at the close of a curious legal suit and restored at Paris, in the studio of M. Facchina, mosaic-worker, under the direction of M. Chas. Lucas, architect, at the cost of about 750*l.*, was sold on the 16th of last month for 76*l.* to the Museum of the city of Rouen, where it will go to keep company with the fine mosaic found about twenty years ago in the forest of Bourgthérolde. Fortunate museum of Rouen, to possess these two mosaics, so precious in the history of art!

THE appearance of serious cracks in the Ansidei Madonna since it was placed in the National Gallery is matter for great regret, and it calls for careful consideration as to the cause of this injury. It has been attributed to the dry atmosphere of the National Gallery causing the planks on which the picture is painted to shrink. We should hesitate to say that the National Gallery is over-warmed, which is the reason assigned in some quarters; but whatever the cause, the painful fact is undeniable, and we are astonished at Sir F. Burton's letter in the *Times* denying that there has been any change in the condition of the picture, and referring only to "a slight crack high up on the spectator's right, which was manifest enough [at Blenheim] to all who preferred to search for trifling blemishes in a great work rather than absorb themselves in its beauties." This is nonsense, and Sir F. Burton must fancy people have no eyes. There is a great and formidable crack on the *left* of the spectator, which no one could "absorb himself" sufficiently to ignore, and which was certainly not there when we saw the picture the first week it was in the National Gallery.

THE INVENTIONS EXHIBITION.

PRIME MOVERS.—II.

POWER rock-drilling for sinking, quarrying, and general contractors' purposes has during recent years made very great progress, with the result that,—except for small contracts,—hand-labour, which is both slow and costly, has to a great extent been abandoned in favour of power. The powers chiefly employed for driving rock-drills are steam and compressed air; the former does exceedingly well when the drill is not too far away from the boiler, but in deep shafts or workings, where the steam has to be conveyed a considerable distance, it is difficult, if not impossible, to utilise it owing to the condensation which takes place in the pipes conveying it. Under these circumstances compressed air is employed: this is produced by means of steam-engines specially constructed for the purpose, of which several examples are to be found in the Exhibition. Amongst these may be mentioned one by Messrs. Hathorn &

* Since writing the above we learn that the fragment has just appeared in the last issue of the "Archæologisch-Epigraphische Mittheilungen aus Oesterreich."

Co., of London, which presents several features of interest, and appears to have been well thought out; the main frame is self-contained, which, with an extended bed-plate, insures steadiness in working, and it may with tolerable facility be moved from place to place, which is no mean advantage. The engine has two steam, and one air, cylinder, with two crank-pins, which form throws for the slide-valves; the inlet valves are of cylindrical form, with central guides, and are automatic in their action. Springs for working the valves are dispensed with, which is an advantage, as they are apt to clog or break, and their action is to a greater or less extent affected by constant usage, and by severe changes of temperature. The valves are so arranged that they may be examined without breaking the cylinder cover joints, which is an improvement. The air-compressor may be worked by means of water-power if available, the steam cylinders, of course, in that case being omitted. As showing the efficiency of compressed air for rock-drilling purposes, it may be as well to mention that a drill driven by it has pierced hard rock at the rate of 5·51 in. per minute.

Messrs. Walker Bros., of Wigan, exhibit an air compressor of massive construction. The engine is mounted on a box bed-plate with tank underneath. The air cylinders are placed in a line with the steam cylinders, and are jacketed with cold water. The air is brought below the floor-line, and the makers claim especial efficiency for the air-valves. The outlet-valves are fixed in the cylinder-covers. The air-cylinders and valves are so arranged that all the compressed air is expelled from the cylinders at every revolution. The general design of the engines appears to have been carefully thought out, and the workmanship is excellent.

Amongst the gas engines is to be seen a new form of horizontal, exhibited by Messrs. Andrew & Co., of Stockport. In this engine two cylinders are placed in line, the crank-shaft, connecting and piston rods working between them. One cylinder is used for compressing the charge, and the other for the ignition and explosion which takes place at every revolution, and considerable steadiness in working is thus assured. The valve for regulating the admission of the gas is of somewhat novel construction, and consists of two cones mounted on one spindle, which is controlled by suitable governor gear. The main frame of the engine is cast in one piece.

The "Otto" gas engine, by Crossley Bros., Limited, Manchester, is well represented. The operation of these is sufficiently well known to render a description unnecessary. One or two fresh departures have, however, been recently made, including a new self-starting arrangement, and the introduction in some of their engines of twin cylinders, in which there is an impulse at every revolution. This arrangement is to be recommended where extreme steadiness in running is required. A small-power vertical engine, which takes up little floor space, is also shown.

The British Gas Engine Company, 11, Queen Victoria-street, E.C., exhibit a rather extraordinary looking novelty in the shape of a gas engine, from which Mr. Atkinson, the patentee, expects great things in the way of economy. We may have something further to say about this at a future time.

Messrs. Körting Bros., of London, exhibit a "Körting-Lieckfeld" gas engine; this is of the vertical type, and is arranged with the working cylinder open at the top,—this is also used as a pump to draw in and compress the charge of gas and air. The different valves are actuated by cams fixed on a supplementary shaft driven from the crank-shaft of the engine by toothed gearing, and it makes half the number of revolutions of the crank-shaft. The chief novelty of the engine, however, is the valve through which the mixture of gas and air is drawn into the ignition-chamber, and is so arranged that the mixture does not vary in proportion. The ignition is arranged to take place immediately the piston has passed the dead centre, and the piston is forced upwards on the return stroke, the exhaust valve is opened by a cam on the intermediate shaft, but part only of the waste gases are allowed to escape, the remainder being mixed with the next charge. The engine is compactly designed, and would appear to be useful for small powers.

A small vertical non-compression gas engine (Wither's patent) was shown by Messrs. Beynon & Cox, of Torquay; it is simple in construction, but does not present any special feature of novelty. The charge is admitted by a single piston-valve worked by a cam, and there is an explosion at every revolution; the cylinder is provided with a water-jacket. As the charge is neither compressed nor wire-drawn the consumption of gas in this engine must necessarily be considerable.

Messrs. Wood, of Bolton, exhibit a horizontal engine of the Corliss type. In driving they adopt the rope system, the fly-wheel and a pulley being grooved for that purpose. The pulleys made by Messrs. Wood have wrought-iron arms, and a split and hooped boss; they are made much lighter than ordinary cast-iron wheels, and can be run at a high speed. The exhibitors claim that owing to their lightness and an improved method of casting which they adopt, and by splitting and hooping the boss, all contractive strains are avoided, and they can be worked in conjunction with toothed gearing without danger of "backlash." The system of driving by rope gearing has of late years been considerably extended, and amongst other advantages claimed for it is, that power may be conveyed from the driving-wheel of the engine directly to several floors at once,—the number and size of the ropes being regulated according to the power to be transmitted: this often avoids the use of a considerable amount of intermediate gearing.

A Root's water-tube boiler is shown by the Patent Steam Boiler Company, Birmingham. In this boiler the principle of construction is the sub-division of the water and steam into tubes of small diameter,—small diameters being superior in strength to large ones. The tubes used are 5 in. diameter, and are made without riveted joints; and, being independent one of the other, the overheating or expansion in one part does not affect another. The water is contained within the tubes. We like the plan of placing the pipe-joints outside the boiler, as any fracture or leakage may readily be detected. In conjunction with this boiler Stollwerck's feed-water purifier is used. This consists briefly of two cylindrical chambers of sufficient capacity to cause a slow circulation of the water through them with room to collect the sediment thrown down. The water having passed through the first chamber is carried through a pipe to the front of the second chamber, where it is diluted with water and steam fresh from the boiler, which throws down a further deposit.

The use of feed-water heaters is considerably extending, and we can strongly recommend their adoption, as all waters contain a greater or less quantity of carbonate or sulphate of lime, &c., which, if not deposited, incrusts the boiler, cause a great loss of fuel, and renders the boiler plates or tubes much more liable to be burned, as the deposit prevents the contact of the water with the surface of the plates, consequently the heat of the fire cannot readily reach the water and be absorbed by it; the plates therefore become burned.

Messrs. Duncan Bros., Queen Victoria-street, London, show a simple reversing gear, in which the slide valves work on an intermediate plate with crossed ports. It is well adapted for launch engines, and does away with the necessity of link motion.

Messrs. Perkins, of London, have one of their compound donkey-engines, for working at a pressure of 500 lb. per square inch. Although this system of extreme pressure has now been introduced some years, we cannot help remarking on the very little progress it has made. We believe this engine is the sole representative of it in the Exhibition.

Messrs. Aveling & Porter, of Rochester, exhibit a well-designed traction-engine, fitted with spring wheels, so arranged that the whole weight of the engine is elastically supported. A noteworthy feature in the construction of this engine is the arrangement of the side-plates of the fire-box, which are extended upwards and backwards in one piece, and provide bearings for the crank-shaft, driving-axle, and counter-shaft. The driving-wheels are fitted with compensating motion, for turning short curves. For general contractors' purposes this engine can be commended, as it combines strength and portability, without cumbrousness or complication.

Hot-air motors are exhibited by Hayward Tyler & Co., Luton; Britannia Co., Colchester; Bailey & Co., Salford. These are all for small powers, and this last one is arranged to work from a gas-jet instead of with coke or small coal.

A tramway engine, worked by compressed air on the Mekarski system, is to be seen in the grounds. Compressed air at some 450 lb. per square inch is employed; this is generated by a high-pressure compressor, manufactured by the General Engine and Boiler Co., London.

The corrugated furnace-flues for steam boilers, exhibited by Mr. Samson Fox, of Leeds, are worthy of notice as being a departure from the beaten track. It is claimed by the inventor that this form of flue gives not only greater heating surface, but considerably greater strength than the ordinary form.

Messrs. Bumsted, of Hednesford, exhibit a Chandler's patent high-speed engine, driving a dynamo direct by means of rope gear. The dynamo makes some 1,500 revolutions per minute, and provision is made for tightening up the ropes by means of a tension pulley. A special feature about this engine is the method employed for securing constant lubrication of the governor gear. This consists in providing a basin, through which the governor-spindle passes, which is partly filled with water made from steam condensation. On this water the oil is allowed to float, and thus lubricate the working parts. A waste-pipe is provided for carrying away any surplus water. The crank and cylinder are oiled in a similar manner, and this plan seems to have surmounted in a great measure a difficulty found in all high-speed engines, viz., that of efficient lubrication. Messrs. Kitson, of Leeds, and Willans, of Thames Ditton, also exhibit high-speed engines.

Messrs. Goodfellow & Mathews, of Hyde, near Manchester, show a high-speed compound tandem triplex engine, especially designed for driving direct, electric lights, fan-blowers, and high-speed machinery generally.

A "Cestus" patent vertical boiler is exhibited by Mr. H. Fletcher, of Gateshead-on-Tyne. The shell of this boiler is of the ordinary cylindrical type, but the fire-box consists of two truncated cones, the upper of which is inverted, and the two are joined together at their smallest diameters. In lieu of the ordinary cross tubes, diagonal tubes are fitted between the sides and the crown of the upper cone. Two uptakes are used, and it is claimed for this arrangement that the heated gases impinge on the whole of the heating surface, spreading out into the upper cone, and surrounding the diagonal circulating-tubes. By this arrangement ready access is given to the crown of the furnace and other parts for cleaning and repairs.

We were struck with the easy working of a very small but very useful "prime mover" in the shape of a hydraulic engine for blowing organs, exhibited by Mr. Blennerhasset, of Vernon-street, King's Cross, London. Two cylinders, somewhat after the fashion of a steam-engine, are employed, and the ports and slides are cut in such a way that the water is "wire-drawn," and the closing or opening of the ports is gradual, consequently the shock usually felt in engines of this class when the water is cut off suddenly, is removed and the necessity of employing an air-vessel is done away with. There is an arrangement for preventing the organ from being overblown.

A somewhat novel method of driving a dynamo has been adopted by Messrs. Brouett, Lindley, & Co., of Manchester. This consists of making the pulley on the dynamo of compressed paper to secure increased adhesion, and causing the fly-wheel of the engine to come into direct contact with it and drive it by friction. To increase the contact if necessary, screwed rods are fitted from the crank-shaft of the engine to the dynamo shaft, and by tightening up the nuts almost any degree of adhesion may be obtained. They also exhibit a new form of governor gear (Lindley's Patent) attached to the vertical compound engine alluded to above: the novelty consists in the use of tension-springs attached directly to the revolving weights, in lieu of the levers and joints usually employed. It is claimed for this plan that the friction in working is considerably reduced, and that increased sensitiveness and simplicity in working is obtained. As a rule, we are not in love with the use of spiral springs,—at any rate, where the duty is severe,—as we have known more than one case where, owing to great variation in temperature, the springs have broken in use, and others where, the work having been very intermittent and severe, the springs have after a time become weakened and lost their elasticity. When these governors have been tested for a length of time under these conditions, say for driving, sawing machinery, callendering rolls, iron rolls, and such like, we should be better

able to judge as to the value of the invention, A very useful addition is the speed regulator attached to this governor, by turning which the speed of the engine can be instantly increased or decreased as may be required.

Messrs. Holman, Bros., of Camborne, have, amongst other exhibits, an air-compressor, which combines several good points in its construction. The pistons of the steam and air cylinders are adjusted so as to have the maximum pressure of steam on the one when the other is compressing the air at its highest point, which allows the engine to be worked expansively and at a uniform rate of speed. The air-cylinder is jacketed with a cold water jacket. Springs are dispensed with in working the inlet and outlet valves.

Amongst the few water motors exhibited we noticed a turbine, by Messrs. Easton & Anderson, of Erith. This was arranged for working a centrifugal pump. Both these are made adjustable for varying falls of water or power required by raising or lowering the fans into or out of the annular troughs by which the fans or working blades are surrounded, the edges of which partially close both the receiving and discharging apertures.

A Ritchie's Patent Turbine is shown by Messrs. Duncan, Bros., of Queen Victoria-street. It is claimed for this wheel that, owing to the shape of the vanes and buckets, the water enters the wheel at its highest velocity and leaves it at the lowest, and that the gate is so formed that the angle of the water, as it enters the wheel, is the same whether the gate be opened more or less. Messrs. Hockey & Co., of Chard, show a Rotary Motor actuated by water. A very considerable number of adjuncts connected with prime movers are exhibited, such as valve-gears, feed-water heaters, boiler-feeders, safety-valves, piston-rings and packing, boiler-coverings to prevent radiation, and *id genus omne*. Many of these possess merits, but the exigencies of our space prevent more than a passing notice.

The exhibits relating to the means of distributing the power of prime movers are not very numerous. The Kirkstall Forge Company, of Leeds, exhibit specimens of their speciality rolled black shafting, with friction couplings and adjustable bearings. The exhibitors claim that this shafting possesses 20 per cent. greater torsional strength, and 33 per cent. greater flexional strength, than ordinary turned shafting. The reasons they give for this are,—that it is rolled so straight round and true, that it does not require turning. We are not in a position to deny this statement, and with the special care taken in the manufacture, it may possibly be true, but we certainly should not recommend our readers to try the experiment of using the ordinary block shafting of commerce without turning.

An apparently effective frictional clutch pulley and coupling is shown by Messrs. Sterne & Co. (Limited), of Glasgow, together with a Clerk's patent gas-engine, fitted with self-starting gear, but the operation of this latter is sufficiently well known that a detailed description is unnecessary.

Medart's patent wrought-iron pulleys are exhibited by Messrs. Richards & Co., of Manchester. A commendable feature in these pulleys, and one not usually found, is the support given to the rim of the pulley by the extension of the base of the arms where they join the periphery.

Wrought-iron pulleys are coming rapidly into use, and are to be preferred, especially where a number of pulleys running at high speeds are required, as they should combine the maximum amount of strength with the minimum amount of weight. Care should, however, be taken in selection, as we have heard of some of faulty construction springing in working. Where large power has to be transmitted, they should in all cases be made with double arms.

The Patent Power Pulley Company, of Manchester, show specimens of their pulleys, these are made of wrought or cast iron; but the peculiarity of construction consists in their having a number of holes made through the rim of the pulley. The advantage claimed for this arrangement is that the slip of the belt is greatly modified by the rapid discharge of the air through the perforations, and, therefore, the belt and the pulley have absolute contact. Before pronouncing an opinion as to the value of this plan, we should prefer to see the pulley tried under varying conditions against ordinary flat-faced pulleys, the mount of slip and power transmitted being accurately measured.

Wrought-iron pulleys possessing more or less merit in construction are shown by Messrs. Mackie & Co., of Reading; Messrs. Hall, of Dartford; Mr. Macbeth, of Bolton; and others.

In concluding our notice of the prime movers at South Kensington, we may add that although the display cannot be held to be entirely representative, there is nevertheless much in this section that should interest and instruct not only the engineer and student, but the public at large, and prove a capital school of technical information.

LETTER FROM PARIS.

STEINHEIL, the well-known glass painter; Regnier, the great actor who maintained so well the honour of the French theatre; De Neuville, the admirable painter of our soldiers and their heroic deeds; Ballu, the eminent architect of St. Ambroise, Le Trinité, and the Hôtel de Ville; and lastly, Victor Hugo, the immortal poet whose obsequies Paris has been solemnising, such is the death-roll of this month, which has seen successively disappear some of our greatest artistic lights.

We should have to greatly enlarge the usual scope allotted to these letters to undertake any adequate funeral elogy on the great genius whom France has just lost. We can but give a few lines to the description of the last honours paid to his mortal remains, at their last halting-place between the Arc de Triomphe and the Panthéon.

With its grand architectural lines and exceptional situation, the Arc de Triomphe formed a very appropriate framework for such a funeral ceremony, and under its lofty vault was constructed the catafalque, 22 mètres in height, the outline of which was visible far off, from Neuilly to the Louvre. Great mourning banners sprinkled with silver, antique tripods disposed around the place, scutcheons bearing the titles of the works of the poet; these formed the decorations contrived by M. Ch. Garnier for the monument where the body of Victor Hugo lay in state on Sunday, previously to being transported on the following day to the Pantheon, the Catholic temple which a recent decree has consecrated afresh to the sepulture of great men, and the decorations of which contrast singularly with the new destination which the French Government has given to the Church of St. Geneviève. The decoration of the cupola, it is true, symbolises the apotheosis of the patron saint of Paris; but as, in 1831, the "Gouvernement de Juillet," while "laicising" the Pantheon, had left intact the paintings of Baron Gros and Gérard, it may be presumed that the Republic of 1889 will in its turn respect those celebrated works. Will it show itself equally impartial to the mural paintings of Puvis de Chavannes, Théodore Maillot, Henri Lévy, Jean Paul Laurens, and Cabanel, to which M. Charles Yriarte devoted an eloquent article lately in these same pages? Will it maintain intact the admirable mosaic of the choir, for which Hébert designed the cartoons? Let us hope, for the honour of French taste, that Parliament will comprehend that above the region of religious dissensions and political strifes there is an unchanging artistic truth and beauty, and that the Pantheon of great men may equally remain the museum of the artistic genius of the epoch as displayed in sculpture and painting.

For the moment, as it was impossible to do away with the emblems of the Catholic *culte*, all that was done was to drape the principal façade with black, and to mask the decorations of the choir under funeral hangings.

To return to our obituary: M. Steinheil, who died suddenly a few days ago, was the brother-in-law of Meissonier. He leaves behind him a considerable array of artistic work. The restoration of the windows and mural paintings of the Ste. Chapelle, executed in 1850, will have sufficed to ensure his reputation.

Alphonse de Neuville was too well known in England to render it necessary to recount his numerous works. We may recall here only the "The Taking of Bourget," the "Dernières Cartouches," the "Combat at a Railway Station," and the Panorama of Champigny, executed in collaboration with M. Detaille; works which would alone suffice to make the reputation of this remarkable artist, cut off in the fulness of his powers; for De Neuville was only forty-nine years of age.

As to M. Ballu, his name will remain attached to a whole series of monuments to which he has devoted his talent and his whole life. Afflicted with a cruel malady for the last three years, he has nevertheless worked up to the last moment, and has barely had the satisfaction of putting the finishing touch to the municipal palace which he was commissioned to build immediately after the incendiary work of the Communists in 1872. He was a pupil of Hippolyte Lebas and student of the École des Beaux Arts, won the "grand prix d'architecture" in 1840, was member of the Institut (where he succeeded Vaudoyer), commander of the Legion of Honour, and "Inspecteur Général des Travaux diocésains." He was born in 1817. He constructed successively the churches of Ste. Clothilde (commenced by Gau), Ste. Ambroise, Le Trinité, and lastly the Hôtel de Ville, of which the interior decoration is still unfinished. He leaves two sons, one of whom has already shown himself a worthy successor of his father in the profession.

During the past month has been laid the first stone of the new "Lycée Louis le Grand," intended to replace the old College de Clermont, in which, by the way, Victor Hugo studied. The construction of this University building has been entrusted to M. Lecœur. It will stand behind the Luxembourg, a few paces from the Observatory and the Panthéon. A similar ceremony is announced for the 3rd of August next, when the first stone of the new Sorbonne will be laid. The architect, M. Menot, who gained the commission in the public competition opened by the Municipality of Paris, has kindly promised to give the *Builder* a perspective view of the future building as early as possible.

There will take place also shortly, on the occasion of the "Fête Nationale," the inauguration of the statue of Pinel, the celebrated lunatic physician. The monument, the work of the sculptor Ludovic Durand, is being erected opposite the Salpétrière Asylum, on the Boulevard d'Hôpital.

Two other inaugurations will take place this month. One is that of the "Liberté" statue which M. Bartholde executed for New York, and of which the American colony here have offered the city of Paris a reduced copy in bronze, 8 mètres high. This is placed temporarily at Passy, in the Place des États-Unis. It will ultimately be placed, in the guise of a beacon, at the extremity of the Ile des Cygnes, orposite the Champ de Mars. Lastly, last Sunday there took place, at Villers-Cotterets, the inauguration of the statue of Alexandre Dumas the elder, a remarkable work by M. Carrière Belleuse.

We must not forget to mention the sculptor's competition, opened by the municipality of Paris, for the erection of a statue to Étienne Dolet, the celebrated printer and philanthropist, who was burned alive in 1546, in the Place Maubert, as a heretic. The statue, which will mark the place of his suffering, will be executed by the successful competitor in the competition, M. Guilbert, to whom we owe also the statue of M. Thiers, which is erected at Nancy.

To complete the information contained in a former letter, we may record that the exhibition of the works of Eugène Delacroix has produced, deducting expenses, 80,000 francs, a sum which will allow of the erection of a monument which M. Dalou has been commissioned to execute to the memory of the celebrated painter. No sculptor could be better fitted to do justice to the work and to interpret the expressive physiognomy and marked features of the great artist.

Last week the vote for the "Grande Médaille d'Honneur," in the section of painting at the *Salon*, took place. At the second round of voting, M. Bougereau obtained the medal by 72 votes. As to the sculpture section, after three votings without a definite result, it has been decided that the médaille d'honneur for sculpture will not be awarded this year. Lastly, M. Lalou, the young architect whose restoration of the Altis at Olympia has already received its just appreciation in these columns, has carried off the médaille d'honneur in the architectural section; so that our presumptions in his favour have been fully realised.

This subject leads us to speak of the happy innovation introduced by the new Under-Secretary des Beaux Arts, M. Turquet, in respect of which the Government have suppressed the triennial *Salon* attempted to be created in 1883.

The next of these exhibitions should have opened on the 1st of May or June in 1886, but the experiment already has shown the inutility of the undertaking, and the decision of the Government cannot but be approved.

We may remark, in passing, the re-opening of the Musée des Arts Décoratifs, and the two exhibitions of higher artistic interest installed, the one at the École des Beaux Arts, and the other at the Tuileries, Salle des États. The first includes only portraits signed by modern masters; the second, which will last to the 30th of June, is opened for the benefit of the orphans of Alsace-Lorraine. One may see in that collection *chefs d'œuvre* of almost every period from the earliest to the present day.

We must remark also on the new collection of furniture with which the Museum of Cluny has been enriched, including some marvellous examples of Spanish art of the sixteenth and seventeenth centuries. We must not omit either to mention the arrival in Paris of the delegates of the Commissioners of Sewers, who have come over from London to study our system of subterranean communications, and especially the telegraphic and telephonic apparatus in the *égouts* of Paris.

At the moment of writing this letter, we learn that the jury of the *Salon* has not awarded the first-class medals for painting this year. The first medals for sculpture have been awarded to M. Daillion for his work "Le Reveil d'Adam," bought by the Municipality of Paris (the merits of which we have already made known to our readers), and to MM. Desca, Croisy, Cailes, and Roly. The awards of the jury in regard to architecture were not divulged when this letter was sent off.

THE METROPOLITAN DRAINAGE OUTFALLS.

FOR some weeks past the officers of the Metropolitan Board of Works have been conducting experiments at the outfall of the southern main drainage works at Crossness, for the purpose of discovering the best mode of purifying the London sewage. The quantity of sewage dealt with is that of a million gallons in each twenty-four hours, Sundays excepted, and also omitting part of Saturday. A million gallons of sewage per day throughout the year would correspond to a metropolitan population of about 25,000, and so far the experiment possesses sufficient magnitude to afford useful results. It would appear that a large majority among the members of the Board feel sufficiently satisfied with what has been done to decide them in favour of pressing forward. It is perhaps unfortunate that the operations are complicated by the necessity of providing for the deodorisation of the whole of the London sewage during the ensuing summer. This will involve the adoption of chemical treatment of an imperfect and temporary character, to be carried on both at the Crossness and the Barking outfall. To meet the difficulty, the Board have lately authorised an expenditure of 10,000*l.* in addition to sums previously voted; and this extra sum would be obviously insufficient were it not that there is a large stock of chemicals on hand. That which lends especial interest to these proceedings is the evident expectation of the Board that they will ultimately find themselves in the position of being able, by chemical means, to purify the whole volume of the London sewage. An active and prominent member of the Board, Mr. Selway, has incidentally mentioned that to make arrangements to manipulate the sewage would cost a million of money, and occupy two years of time. Of course, London has already paid for its drainage works. Now, having brought all the northern sewage to one point, and all the southern sewage to another, there remains the task of so treating the enormous aggregate that the Thames shall suffer no pollution from its presence.

The chemical method proposed for the accomplishment of this notable undertaking has been devised by Mr. W. J. Dibdin, the Board's chemist, who has also had the benefit of consulting with Dr. Dupré on the subject. Associated with Mr. Dibdin is the Board's engineer, Sir Joseph Bazalgette. These three authorities were engaged together during the spring of last year in experimenting on the sewage at the Western Pumping Station at Pimlico. Some useful facts were then ascertained, but the operations were interrupted by the necessity of promptly deodorising the sewage at the outfalls. The broken thread has since been taken up again, and the chemical process has been more fully tested. Chemistry is not all that has to be brought to bear on this problem. When the solids in the sewage have been precipitated, there is the deposit to be dealt with,—the almost impracticable "sludge," difficult to dry, even in a partial degree, and hard to get rid of in whatever form it may be presented. Those who believe in the manurial virtue of the precipitated matter may have it as a gift. At least, we presume the Metropolitan Board would be very glad if a fleet of barges would come day by day and carry off the entire stock, especially if the drying or semi-drying of the stuff were not insisted upon. It has been proposed to barge the sludge down the river and cast it into the depths of the German Ocean. To this there would be objections, and the cost is reckoned at 37,000*l.* per annum, in addition to a capital outlay of 130,000*l.* for the barges. Instead of drowning the sludge it has been proposed to burn it, and another plan is to bury it. Out of all the schemes it is to be hoped that one will be found available, without offence, and without extravagant cost. The bare precipitation seems to present less that is problematical. It must be acknowledged that the quantities are startling. A grain in the gallon is ten tons in the day's sewage. This fact is enough of itself to shut out many chemical processes which look very pretty in a laboratory, but which are quite hopeless at the mouth of a metropolitan outfall. Mr. Dibdin uses 3·7 grains of lime and 1 grain of proto-sulphate of iron per gallon. In the joint report presented to the Metropolitan Board by Sir J. Bazalgette and Mr. Dibdin, it is calculated that the whole of the sewage can be thus precipitated, the sludge disposed of, and the effluent deprived of all offensive odour by a supplementary process during the summer months, at a total capital expenditure of a little under 1,000,000*l.*, and at an annual outlay of 100,000*l.* As a penny in the pound on the rateable value of the metropolis will produce 120,000*l.*, the financial prospect is not very distressing.

The Royal Commissioners who have reported on the main drainage outfalls have recorded their opinion that mere precipitation will not be sufficient to prevent the sewage from rendering the river offensive. They speak of "injury to fish and danger to wells." If fish will live in the effluent before it enters the river, there will be very little to fear in this respect. As for the wells, if they receive no harm from the sea-water which mingles with the Thames below Blackwall, they are not likely to be damaged by the effluent from the sewage works. The Thames, as affected by the outfalls, has no relation to any drinking supply. Hence the effluent need not possess the purity which otherwise might be demanded. But the Royal Commissioners consider that the effluent, if discharged at the present outfalls, ought to be filtered through land. This is a formidable proposal, and one which it is to be hoped may be avoided. If filtration cannot be adopted, owing to the want of land or its high price, the Commissioners recommend that the effluent should be taken down to the estuary of the Thames and there discharged into the river. Of course, if filtration is necessary, it must be accomplished, or the alternative plan adopted. But wisdom seems to suggest that the chemical treatment should first of all have a trial. If it proves insufficient, no serious harm will have been done. Land may then be bought, or the requisite conduits constructed to carry the effluent down the river. Experience, however, may show that these further proceedings are unnecessary, and there can be no doubt that a fair effluent will have a very different effect on the river compared with the raw sewage which now flows into it, with all its enormous bulk of solid and putrefying matter.

ARCHITECTURAL SOCIETIES.

Birmingham Architectural Association.—On Saturday last the members of the above Association paid a visit to the new Liberal Club now in course of erection in Edmund-street, from the designs of Mr. Cossins. Amongst those present were Messrs. Cossins, W. H. Kendrick (vice-president), Victor Scruton (hon. sec.), A. Hale, F. Bailey, T. W. F. Newton, O. Essex, H. H. McConnal, C. E. Bateman, A. J. Craddock, J. Goodman, W. Midgeley, &c. Before inspecting the building, Mr. Cossins conducted the members to the clerk of works' office, where an inspection was made of the plans, sections, and elevations of the club, the arrangement and disposition of the various apartments were discussed, and much interest was shown in a novel device in case of fire, consisting of an iron hand-rail ladder running externally from the top of the building to the bottom. Under the guidance of Mr. Cossins the members then visited the whole of the building.

Liverpool Architectural Society.—The first meeting of the recently inaugurated Junior Debating Club, membership of which is free to all professional non-practising members (*i.e.*, assistants and students only) of the Society, was held on the evening of the 1st instant, at the Society's rooms, No. 9, Cook-street, when Mr. Walter H. Brierley read a paper entitled "Pitfalls," detailing the many errors the young practitioner is liable to, and showing how they may be avoided. Mr. James Nicholson was voted chairman for the evening. There was a good attendance, and an interesting discussion, in which Messrs. J. B. Hikins, E. P. Hinde, R. Holt, C. J. Andersson, C. R. Chidson, W. N. Stephenson, T. J. Dalziel (visitor), G. Hornblower, and the chairman took part, followed. The next meeting will be held June 15th, when Mr. S. J. Dalziel will read a paper entitled "Early Gothic Vaulting."

Edinburgh Architectural Association. — The series of Saturday afternoon visits in connexion with this Association was brought to a successful close for the season on Saturday last, when a party numbering over sixty members and friends made their annual excursion to Inchcolm Abbey, Donibristle House, Dalgetty Old Church, Aberdour Castle and Church, under the leadership of Mr. Hippolyte J. Blanc. The party left by special steamer in the forenoon, and on reaching the island of Inchcolm the company assembled in the chapter-house, where an interesting paper sketching the history of the monastery and abbey was read by Mr. Blanc, and by a plan prepared from a survey of the buildings, together with a number of photographs, specially taken, the various features of the structure were illustrated in order. In connexion with Donibristle Mr. Blanc sketched the history and incidents pertaining to it, from its possession by the Abbots of Inchcolm down to the period of the fire in 1857, drawing attention to the fine specimen of hammered ironwork in the fine old gates and staircase railing; and of Dalgetty, now a ruin, he noted its association with the Abbey of Inchcolm, as a chapel of ease, it is stated. The party next proceeded to Aberdour Castle, which, with its interesting and characteristic detail, was described and examined from the original keep with Norman and Gothic features, to the additions in succession down to the seventeenth century. The old church in ruins, comprising nave, aisle, and apse, was next visited. Mr. Blanc noted that as an example of very early work in Scotland it was most interesting, and could be made instructive to the archæologist by a judicious clearance of the rubbish and *débris* in which it lies buried. At the close of a very enjoyable day a hearty vote of thanks was accorded Mr. Blanc for his series of instructive papers.

SURVEYORSHIP ITEMS.

West Suffolk.—An adjourned meeting of the West Suffolk Quarter Sessions was held on the 27th ult. at the Shire Hall, Bury St. Edmund's, for the purpose of appointing a county surveyor for the western division of the county. Mr. N. Barnardiston presided, and there was a large attendance of justices. The Finance Committee has received 68 applications for the post. Of these 68 gentlemen they selected four, the election ultimately falling upon Mr. Frank Whitmore, Chelmsford and London.

Hampstead.—Mr. Frederick Stone, of 31, John-street, Bedford-row, has been appointed Deputy District Surveyor for Hampstead, by the Metropolitan Board of Works.

Sculpture at the Royal Academy.—In the article on this subject in the *Builder* of May 23rd, the bust of the late Mr. Fawcett in the Academy was, by an oversight, attributed to the wrong artist. The bust, which is a very able one, is the work of Mr. H. R. Pinker.

THE ARCHITECTURAL ASSOCIATION.

A SPECIAL business meeting of the members was held on Friday, the 29th ult., to consider the report of the committee upon a scheme for amending and consolidating the work of the Association. Mr. C. R. Pink, President, occupied the chair.

The following new members were elected:—Messrs. B. Pithick, P. J. Dawson, J. C. T. Murray, E. G. Braybrook, and E. C. Bateman.

Votes of thanks in connexion with the late visit to the new Tilbury Docks were accorded to Mr. Grüning, the architect; to Messrs. Manning & Baynes, the engineers; and to Messrs. Perry & Co., the contractors.

The Chairman then said that the members had met to transact some important special business, and he would not by any prefatory remarks intervene between the meeting and its object. At the same time he would be wanting in a due sense of the honour they had done him if he did not avail himself of the opportunity of thanking them for his election as President for the ensuing session.

Mr. J. A. Gotch proposed the adoption of the report, which had been taken as read. He remarked that the object of the whole movement had been to simplify and systematise the work of the Association, so that any one on joining could see at once the best course to pursue so as to derive the greatest benefit from the classes and opportunities offered by the Association. Some of the clauses of the report were of slight importance, while others contained the gist of the proposed alterations, which were mainly as follow:—The object aimed at was, first, to divide the work of the Association broadly into two classes, the advanced and the elementary. One of the most important features was that there should be a Committee of Advice, whose duty would be to advise persons joining the Association on the particular course of study they should pursue. This he considered to be one of the fundamental changes. Another important proposition was for the appointment of a committee of outside visitors, to be elected each session from all the classes. It was intended that the visitors should be men of eminence in the profession. At present the visitors were merely past grand-masters of the Association, and it was now proposed that some men of acknowledged eminence should, of their great kindness, attend the classes, and give instruction to the aspirants after fame. It was also proposed that there should be a permanent committee in connexion with the classes, so that the Secretary or President would be present to carry on the work of the classes from time to time, and this committee would be *ex officio* members of the committee of advice. These were the principal changes. It seemed to be the general opinion that the work they had tried to do in the elementary classes had been rather too ambitious, and it was proposed to somewhat lower the aim. The Elementary Class of Design was to be divided into two sections,—one for the study of ancient examples, and the other for design based upon ancient examples. The lectures on the history of architecture and on construction were also intended in future to proceed *pari passu* with the work of the classes. Another important innovation was the Class for the Study of Quantity-taking and Specification-writing. It was intended, moreover, that the study of Planning should be taken from the Class for Specification-writing, and placed where it ought to be, with the study of Design. Stress was to be laid on the strict carrying out of the rule as to members contributing to the work of their classes. One of the great prizes which the Association offered, viz., the Travelling Studentship, was to hang upon the recipient having gone through the work of the session. It was proposed to elucidate these matters by means of a chart showing the sort of curriculum which the Association offered. He might add that it was intended that no member of the Elementary Classes should be eligible to compete for prizes after he had attended two sessions in that class, which would be an inducement to get on as soon as possible. Arrangements were to be made for visiting buildings in progress of completion, and that during office hours. The proposal to extend the library would be hailed by all with gratitude, and a place where the members could read the professional journals, and get a cup of tea or coffee at a fixed tariff, would be a great advantage. Mr. Gotch concluded his remarks, which were very well received, by formally proposing the adoption of the report.

Mr. John Slater, B.A., seconded the motion. He believed that the committee of advice would be an extremely good thing, and many of them would have been glad if they could have applied to such a committee in their early days. He considered that this report marked rather an important era in the history of architectural education. A great stride was made when the Institute established the Obligatory Examination, the advantage of which had not been so thoroughly appreciated as it ought to have been. If it were known to the public that it was necessary before a man could become an Associate of the Institute that he must have shown some knowledge of the subjects in which he was to practise, it could not fail to raise the status of the profession. Study and education must be good to a man, no matter what branch he practised in, and anything that could be done to systematise the course of study would be a great boon to the younger members of the profession. To his mind the present seemed to be the time for doing this.

The meeting then considered the report clause by clause, when a long discussion ensued, in which Messrs. Cole A. Adams, J. Douglass Mathews, H. Stannus, Aston Webb, H. W. Pratt, Stokes, Morgan, and others, took part.

A few changes and additions were made, and the report was adopted *nem. con.* in the following form:—

"1. That there shall be two defined divisions of study in the Architectural Association, to be called the 'Elementary Division,' and the 'Advanced Division.'

2. That a Chart, as here given, be drawn up, explanatory of this principle for the use of Students and others.

CHART.

Elementary Division.

SEC. I.—El. Class of Design. SEC. II.—El. Class of Design.	El. Class of Construction.	Lectures on History and Construction.
See pages *	*See pages* *	*See pages* *

Advanced Division.

Class of Design. Class of Colour Decoration.	Class of Construction. Advanced Class of Construction.	Class for Quantity-Taking and Specification-Writing. Class for Land-Surveying.
See pages *	*See pages* *	*See pages* *

* Here would be indicated the pages of the Brown Book.

3. That a Committee of Advice, whose names shall be published in the Brown Book, be appointed by the Committee each session, whose duty it shall be to recommend to members on application the particular course of study it would be advisable for them to pursue in the Architectural Association.

4. That a Circular be published containing General Suggestions, the Chart, &c., for the guidance of Students and others, and the same be also included in the information afforded by the 'Brown Book.'

5. That there shall be a Committee of Visitors appointed each Session to all the Classes, to conduct the work of the same. The Visitors to be *ex-officio* Members of the Committee of Advice.

6. That the Classes be arranged in the following order, viz.:—

7. *Elementary Class of Design.*—Section I., for Study of Ancient Examples; Section II., for Design based upon Ancient Examples.

8. *Elementary Class of Construction.*—The subjects to be treated in a more *Elementary* manner than has hitherto been adopted, but on the same principle.

9. *Lectures on the History of Architecture and Lectures on Construction.*—That the principle of *vivâ voce* questioning be adopted at the Lectures, and the subjects treated of, to work in conjunction (as far as possible) with those set down in the Classes.

10. *Class of Design.*—Conducted on the same lines as at present.

11. *Class for the Study of Colour Decoration.*—Conducted on the same lines as at present.

12. *Class of Construction and Practice.*—Conducted on the same lines as at present.

13. *Advanced Class of Construction and Practice.* Conducted on the same lines as at present.

14. *Class for the Study of Quantity-taking and Specification-writing.*—That a New Class be formed, and that *Planning*, which has hitherto been taken conjointly with Specification-writing, to be now omitted from this Class, and embraced in the work of the Class of Design.

15. *Surveying Class.*—To be conducted on same lines as at present.

16. That Members of the Elementary Classes be eligible to compete for prizes in their Class during their first and second sessions only, but not after having attained the age of twenty-three years after the last meeting of the Session.

17. That the Rule as to Members contributing to the work of the Classes in future be strictly observed. That the amount of work in the various Classes be reduced.

18. That in awarding marks in the Classes of Design, greater stress be laid in future on the quality of the Draughtsmanship.

19. That the Session shall commence on the first Friday in October, and finish by the end of April or beginning of May.

20. That the Essay Prize be of the value of 5*l.* 5*s.*, and be accompanied by the presentation of a Silver Medal; that the A. A. Design Prize be of the value of ten guineas, and be accompanied by the Silver Medal.

21. That under necessary regulations, arrangements be made for the inspection of Buildings in progress by individual members during working-hours, and also to practical workshops, and if means are forthcoming, to provide technical and experimental instruction.

22. That after the year 1886 Candidates for the Travelling Studentship be required to show that they have passed satisfactorily through one or more of the Classes, except in the cases of Country Members, which shall be referred back to the Committee. That the names of the holders of the Studentship be published in the Brown Book, and that the sketch of each Student, which by the existing condition of the Competition becomes the property of the Architectural Association, be framed with the name of the Student and date of his year, and hung in the rooms of the Architectural Association.

23. That it is desirable that the Library accommodation be extended and be opened to Students two evenings in the week, and a General Meeting Room be attached where the professional journals, &c., can be seen, and tea and coffee obtained at a fixed tariff.

24. That the distribution of Prizes and delivery of Addresses be in future omitted at the *Conversazione*.

25. That at the Annual General Meeting the prizes shall be distributed, the President shall deliver his address (as heretofore) and that short Addresses be invited from the Senior Members of the profession.

26. That the following alterations be made in the Rules:—Rule 3, on 6th line, after 'Classes' to insert 'and Lectures.' Rule 38, on 3rd line, after the words 'shall be' to omit those to the end, and substitute 'placed at the disposal of the Members, the Prizes shall be distributed, the President shall deliver an Address, and short Addresses be also invited from Senior Members of the profession.' Rule 40, on 2nd line, after the word 'Session' to omit the words to the end of Rule. Rule 41, on 2nd line, to substitute 'May' for 'June.'"

Mr. Cole A. Adams moved that the subscription should be increased to £1. 1*s.*, pointing out the great advantages offered by the Association, and believing that no one would grudge to assist in its development. The Association must advance with the times, and the increased amount of funds would be applied in providing technical instruction, in improving the library, and possibly in printing and publishing their papers. Out of 1,000 members to whom circulars were sent, 100 had replied, 60 being more or less in favour of the increased subscription, while 40 were decidedly against it.

Mr. Aston Webb seconded the motion, adding that it was necessary for the extension of the work of the Association.

Mr. J. D. Mathews strongly objected to the resolution. He had been connected with the Association for twenty years as treasurer, and he had never had any difficulty in meeting the expenses. The work was carried on at an almost nominal cost, and he must differ entirely on this matter with the proposer of the resolution. The success of the Association had been caused by the fact of its being purely self-supporting.

An amendment was proposed and seconded that the matter should stand over for future consideration.

In the discussion which followed Messrs. Gotch and Slater supported the original resolution, which was opposed by Messrs. Surr, Leberton, H. Yorke, Brodie, and Stannus.

Mr. H. W. Pratt proposed a fresh amendment, to the effect that the increased subscription be for town members only, defining the radius as twenty miles around London.

This amendment was seconded by Mr. W. Pite.

Mr. Cole A. Adams replied, amidst cries for an adjournment. The first amendment being put, 41 hands were held up in its favour and 41 against. Tellers were then called for, but, while they were being chosen, the chairman gave his casting-vote in favour of the original resolution. Tellers were still called for, but the demand was eventually withdrawn.

Mr. Stannus then moved the adjournment

of the meeting for a fortnight, when they would be less heated, and this, being seconded by Mr. Baggallay, was put to the vote and carried. The proceedings then terminated.

AN ARTISTIC LAW CASE AT SIENA.

THERE is at present proceeding in the Assize Court of Siena a trial of somewhat more than ordinary interest concerning the theft of a work of art of considerable value. The work in question is a magnificent *piviale* or vestment, resembling a large mantle, and is worn by high-church officials on great occasions over the ordinary surplice, entirely covering the body.

This *piviale* is of thirteenth-century workmanship, and was one of four manufactured at the same time. Of these four two have been destroyed; one is, according to report, in London; and the other is the one at present under consideration. It was presented by Pope Pius II., secularly known as Acucas Sylvius, of the Piccomini family,—a family well known in the records of Siena,—to the Cathedral of Pienza, a small town in Tuscany, about fifty miles south of Siena, where he was born, and was one of many works of art with which he enriched his native place.

It is rumoured that the destruction of the two out of the four *piviale* was caused by the habit of the Mediæval Italians of hanging such valuable draperies from their windows on the occasions of festivals, &c., exposing them to every shower of rain, and then putting them away in a damp condition.

About two years ago an exhibition of works of art was held at Siena, and amongst the objects exhibited was the said *piviale*, which attracted much attention. In fact, soon after the exhibition an offer was made,—it is currently reported in Siena of 12,000*l*., but this on examination turns out to be a myth,—to purchase it by Dr. Clifford, the Roman Catholic Bishop of Bristol. Soon after the exhibition it disappeared, and no more was heard of it until it was offered for sale by a Florentine antiquary to a French nobleman, who seeing the great value of it began to ask awkward questions, in the course of which it was elicited that it had been stolen and sold to this antiquary, —who had valued it at 70,000 francs,—for 2,000 francs.

A man and a woman were brought up charged with the theft, and the trial was held at Siena. The case against the woman failed,—so a second trial is proceeding against the man, who is a member of the *carabinieri* or *gensdarmes*. The robbery appears to have been perpetrated in a very cunning way, as in order to get at the plunder it was necessary to obtain three keys, which were in the possession of three different persons. It is, therefore, to be supposed that the position of the accused as guardian of the peace was of some assistance to him in his craving after articles of *vertu*.

The writer of this article,—by the courtesy of the judge presiding at the second trial, whose acquaintance he had made,—was allowed, together with two English ladies and a gentleman, to inspect the *piviale*. The manner in which this inspection was permitted is somewhat amusing, and will appear strange to those who are accustomed to the sedate proceedings of our own courts of law. At the commencement of the day's proceedings the party above mentioned were ushered into court, and then shown to reserved seats between the jury-box and the dock occupied by the prisoner. After various formalities, such as the calling over of the names of the jury and the unsealing of various envelopes containing the keys which had been obtained for the purpose of the theft, at the invitation of the judge they were requested to ascend to the bench to inspect the *piviale*, which was displayed on chairs arranged in front of the bench, the case meanwhile being stopped. After a hurried inspection of about a quarter of an hour, polite bows were made to the judge, the party retired, and the case was allowed to proceed.

The *piviale* is semicircular in shape, measures at the diameter about 3½ yards, and is of exquisite workmanship. It is divided by flowing lines into irregular panels, which are embroidered with figures illustrating various Biblical subjects, there being about twenty-five of these panels, as nearly as could be guessed from so short an inspection. The panels are bordered with leaves and geometrical patterns, exactly resembling in colour and design those that are to be found in illuminated missals of the thirteenth century. The figures are worked in very rich tints, the whole of the needlework being executed in silk and gold embroidery.

The question as to whether the Church of Pienza has the power to sell this valuable piece of Mediæval needlework is in dispute, there being a law in Italy that no valuable articles of *vertu* are to be sold without the consent of the Government, so that it is extremely doubtful whether the second *piviale* will find its way, as the only other existing one has done, to England.

Illustrations.

BRIGHTON COLLEGE.

BRIGHTON COLLEGE was founded in 1845, and moved to the present site in 1847, where the first part of the school buildings was erected by Mr. George Gilbert Scott. Further additions were made by the same architect in 1854, 1859, and 1862. After the death of Sir G. G. Scott the college appointed as its architect Mr. T. G. Jackson, who was formerly a pupil of the school, and under his direction the play-ground was levelled and a cricket pavilion built in 1883, and an extensive scheme has been prepared for the completion of the college buildings, part of which is now in progress of being carried out. The entire scheme includes the erection of a new chapel to replace the present building, which is too small, a large schoolroom, additional classrooms, an entrance tower, four boarding-houses, a sanatorium, and gymnasium and lavatory.

The whole of these will be grouped within the college gates, and will form three sides of a spacious quadrangle of which Sir G. G. Scott's buildings will occupy the fourth. One boarding-house is now finished and occupied, and a second is in progress and will be completed within a few months. The gateway tower and porter's lodge are being carried up at the same time.

The materials employed are brickwork and terra cotta for the exterior faces, and flint facing with terra cotta for the walls that face inwards to the quadrangle. It is believed that the superior durability of terra cotta will enable it to resist the trying climate of the south coast better than the ordinary building stones.

The illustration is taken from one of two drawings exhibited this year at the Royal Academy.

KING'S COLLEGE CHAPEL, ABERDEEN.

THE tower of this chapel, with its curious and picturesque "crown," will be remembered by all who have ever been in Aberdeen. The whole building is exceedingly characteristic, with its occasional pier or wide mullion up the centre of the windows, its foreign-looking buttress finials, and its picturesque variety of fenestration and tracery. The careful measured drawings by Mr. J. C. Watt, which we publish nearly entire, and which gained a medal of merit from the Institute of Architects, form a valuable record of an extremely interesting building.

The following extract from the writings of John Spalding, recording in old Scottish spelling the disaster to the "crown," and its rebuilding in 1633, may be of interest here :—

"Vpone Thuirsday the sevint of Februar thair began ane gryt storme of snaw with horribill heiche wyndis, quhilk wes nottit to be vniuersall throw all Scotland. Thir hideous wyndis wes markit to be suche as the like had never bein sein heir in thir pairtis, for it wold overturne countrie menis houssis to the ground, and sum personis suddantlie smoirit within but releif. It also threw down the staitlie croun biggit of curious ashler wark, af of the steipill of the Kingis college of Old Abirdein, quhilk thairefter wes re-edefeit and biggit wp litle inferior to the first."

SCULPTURE AT THE ROYAL ACADEMY.

"PLAY," BY MR. S. FRY.

WE give a facsimile, somewhat enlarged, of a pen-sketch of this work which the sculptor has been kind enough to send us. The group is in terra cotta, and, as we have already remarked, is a very successful example of the combination of modern feeling and realistic treatment with true sculptural effect.

GROTESQUES FROM NOTRE DAME, PARIS.

THESE figures stand at the angles of the south-west tower of Notre Dame, Paris, emphasising its termination. I cannot vouch for their strict accuracy, as they have been made from such extremely rough notes as I was able to make on the spot; and I regret to find on comparison with Méryon's etching of the "Stryge," that my version of the creature resting on his elbows beyond the hooded birds is entirely incorrect. Still they give some idea of these masterpieces of "the true grotesque" works which show in every stroke of the chisel that they belong to the finest period of Gothic sculpture.

The energy of idea that could realise such fantastic imaginations as these is peculiarly Gothic. The sacred subjects that glorify the west fronts of the great cathedrals form an unequal parallel to the sculptured myths of Greece, but here in the grotesque we have a new element in art for which no prototype can be found in mature Greek, Egyptian, or Assyrian art. The point is that it is in mature work, as this Gothic work undoubtedly is, for it would be no answer to this to produce the crude efforts of primitive art, and it seems certain that the wild poetry of such figures as these would have been, one cannot say beyond the power, but outside the range of a first-rate Greek artist. He could not have conceived of that mixture of the foul and beautiful, of the sublime and horrible, which Gothic art has created.

An analysis of the mental condition of the men to whom such thoughts were possible would form an interesting study in psychology, but our ignorance of Mediæval thought is still too great to admit of it on any historical method. Possibly it resulted from the strenuous vigour and imperfect culture of the races that superseded the older civilisation. But whatever its origin, it is the announcement of a new departure in art, of that romantic tendency which has formed so important a factor in modern European thought.

R. T. BLOMFIELD, M.A.

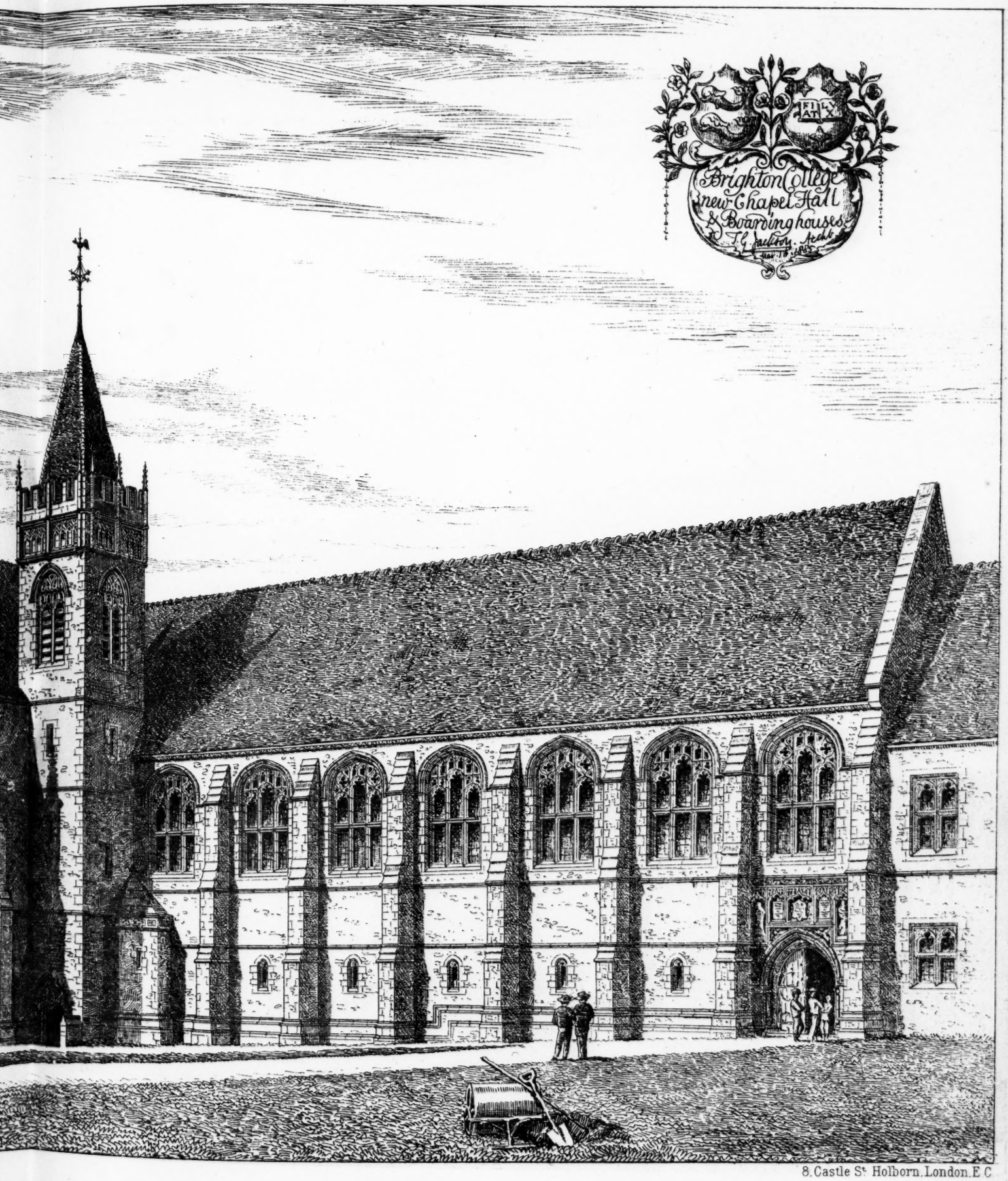
OBITUARY.

Mr. John Parnell.—We much regret to record the death of Mr. John Parnell, senior member of the well-known firm of Parnell & Son, builders and contractors, Rugby. His demise took place after a long and painful illness at his residence, Brookfield, Rugby, on the 17th ult., in the 69th year of his age. He was one of the largest employers of labour in the neighbourhood. About forty years ago he commenced business in a small way, but the business gradually extended until the firm became one of the best known in the Midland counties. The firm was extensively occupied in works for the London and North-Western Railway Company, and the new station contract at Rugby was gained in competition by them recently, and the works are now rapidly proceeding. The firm has also carried out extensive works under most of the foremost architects of the last quarter of a century. For example, under Mr. A. Waterhouse, A.R.A., the firm has executed several important works, the most notable being the new St. Paul's Schools at Kensington, and the new Congregational Chapel at Hampstead, both being very creditably completed by them. They have also done a great deal of work in the shape of barracks and military depôts for the War Department. They employed from 1,500 to 2,000 persons. While doing so much work in various parts of the country, they have ever been mindful of their native place, and all the work in the way of joinery and machine-work that could be done there has been executed at Rugby, where a staff of upwards of 100 men are continually kept employed. About eighteen years ago Mr. Parnell built for himself his residence at Brookfield, Rugby. He leaves a widow, two sons, and three daughters to mourn his loss. The funeral took place at Rugby Cemetery, on the 20th ult. Following the body were Mr. W. Parnell, of London, and Mr. J. Parnell, of Rugby, his sons, Mr. Allan and Mr. Heenan, his sons-in-law, and numerous other relatives and friends, besides clerks and foremen in his employ, and about 150 workmen.

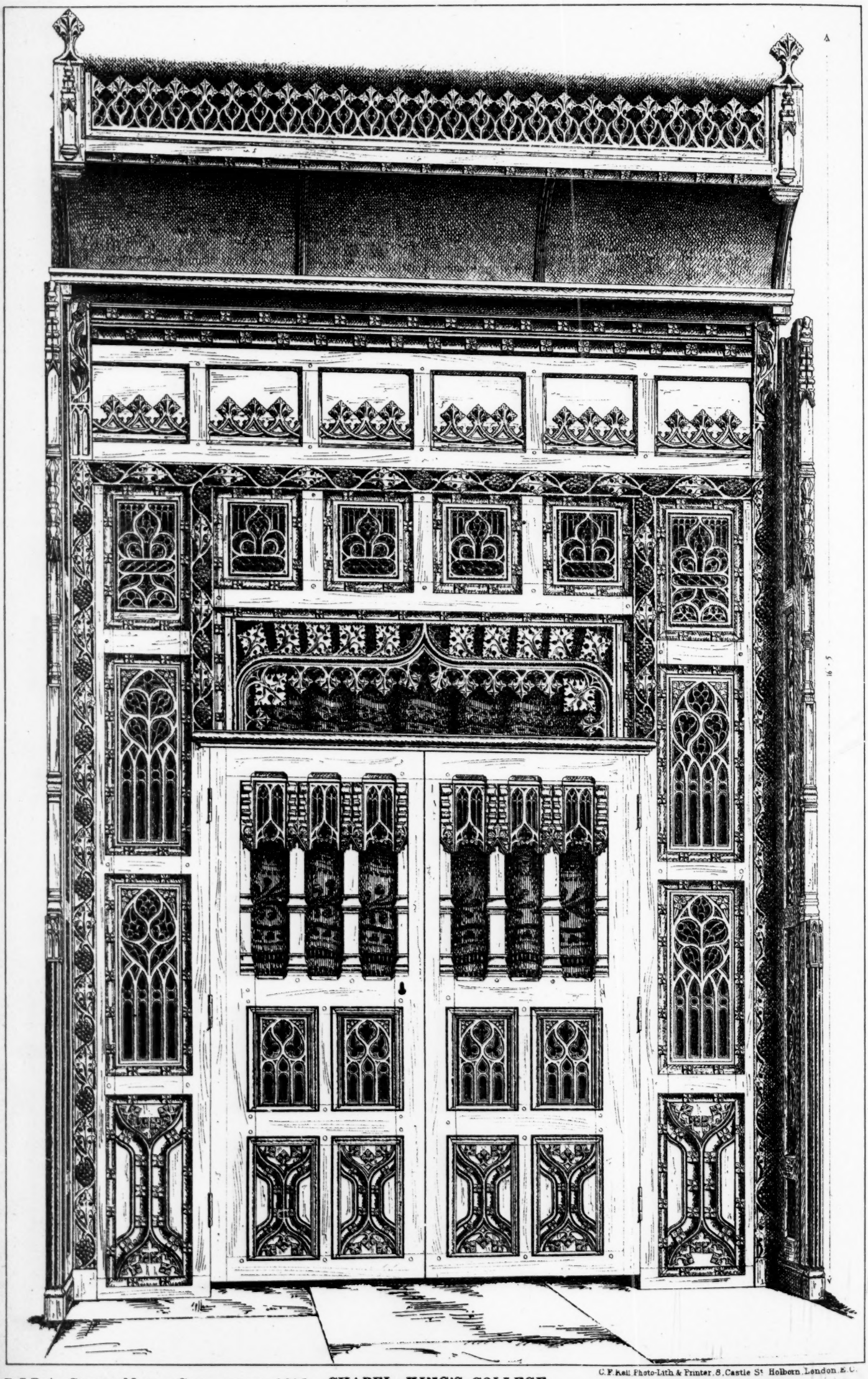
The Gray Memorial at Cambridge.—Last week a statue of the poet Gray, the work of Mr. Thornycroft, was unveiled at Cambridge.

C. F. Kell Photo-Lith. & Printer.

NEW BUILDINGS, BRIGHTON COLL



COLLEGE. MR. T. G. JACKSON, ARCHITECT.



C.F.Kell Photo-Lith & Printer, 8, Castle St Holborn, London, E.C.

R.I.B.A. Silver Medal Competition, 1885.
Medal of Merit and Premium Awarded.

CHAPEL, KING'S COLLEGE, ABERDEEN UNIVERSITY.
Door in Screen.

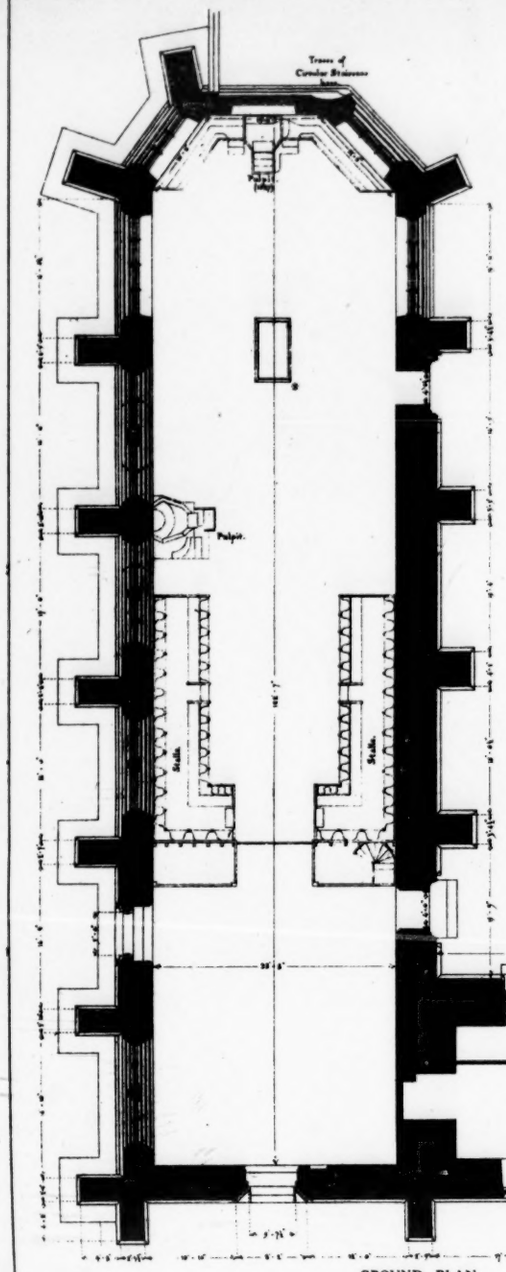
Measured and Drawn by
Mr. James C. Watt.

Wyman & Sons, Photo-Litho C^t Queen S^t London, W.C

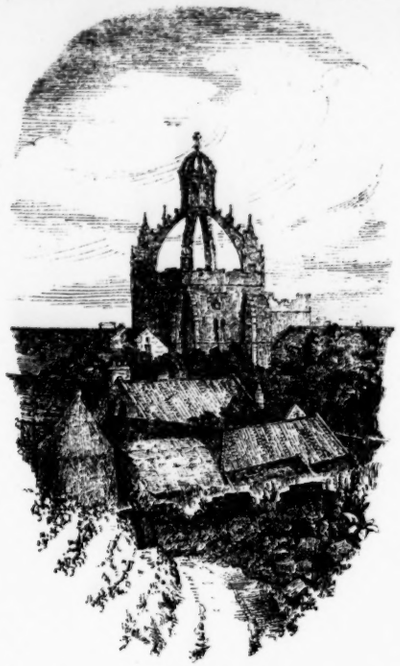
SCULPTURE AT THE ROYAL ACADEMY: "PLAY."——By Mr. S. Fry.

From a Sketch by the Artist.

CHAPEL AND TOWER, KING'S COLLEGE ABERDEEN UNIVERSITY.



GROUND PLAN.

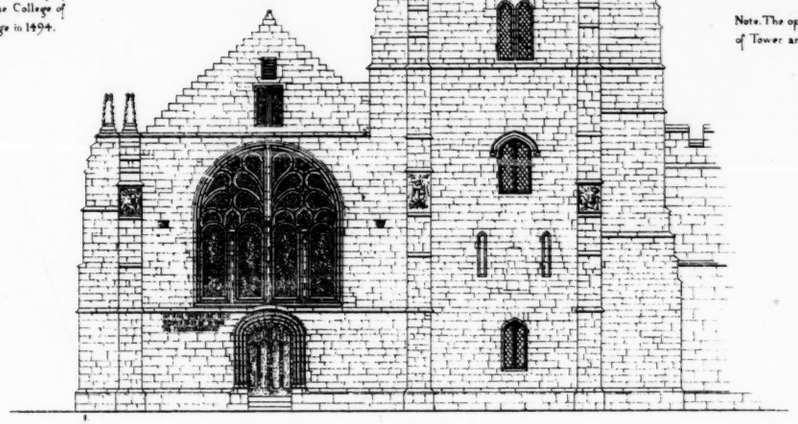


From the North West.

* Tomb of William Elphinston, Bishop of Aberdeen, who founded the College of S. Mary or The Kings College in 1494.

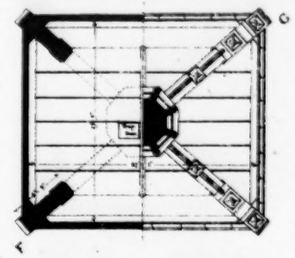
Block Plan of College

Note. The Lantern was built in 1500, blown down 7th February 1633, and re built by one G. Thomson in 1634.

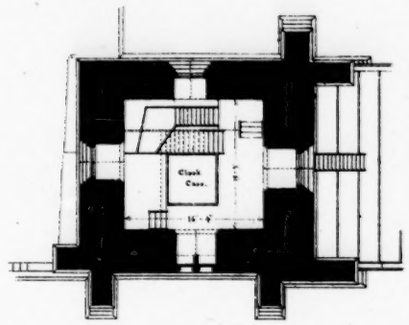


WEST ELEVATION.

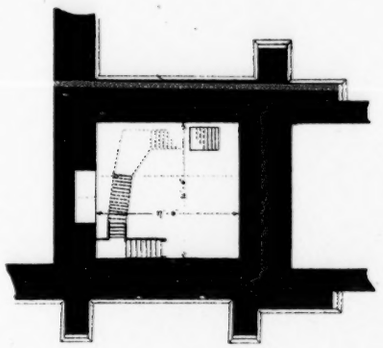
Note. The openings in front of Tower are modern.



PLAN at C. PLAN at D.



PLAN at B.



PLAN at A.

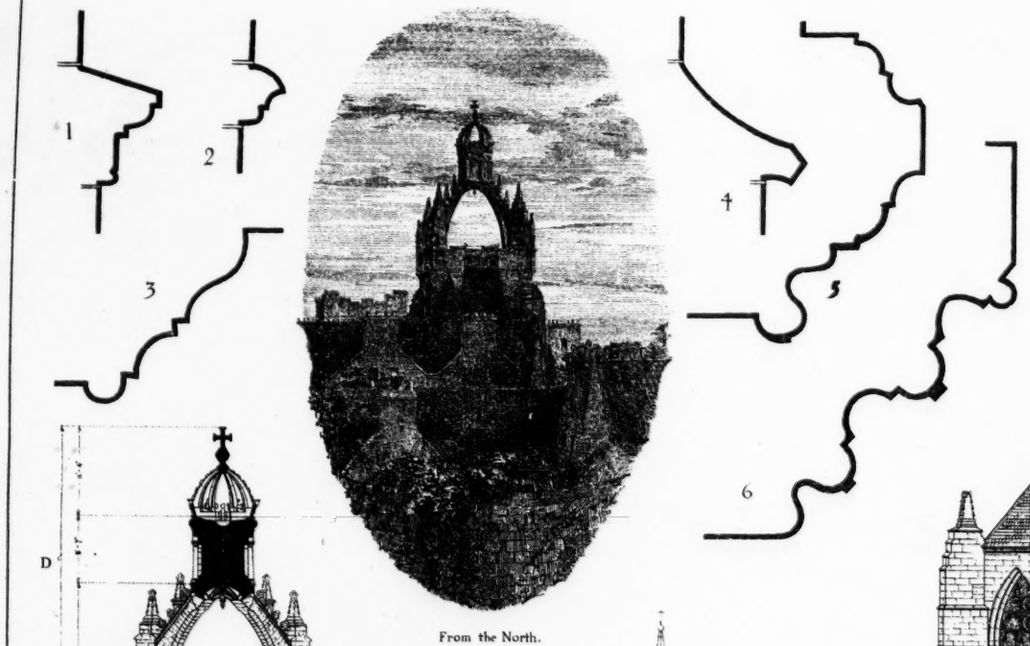
Scale of Feet.

C. F. Kell, Photo-Litho.

R.I.B.A. Silver Medal Competition, 1885.
Medal of Merit and Premium Awarded.

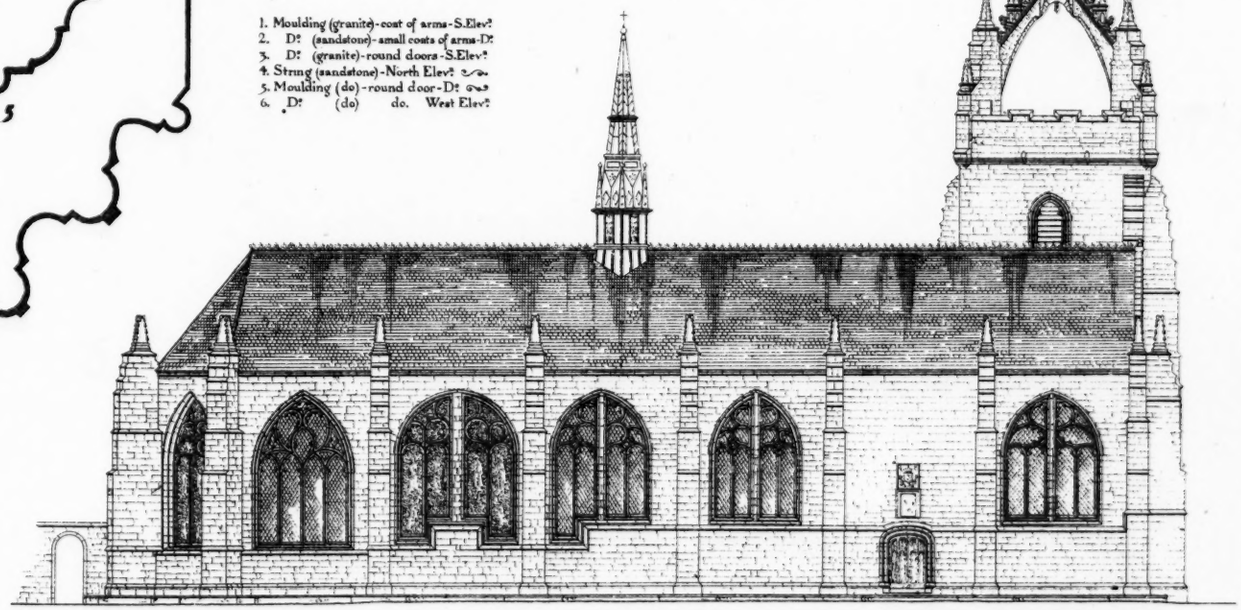
Measured and Drawn by Mr. James C. Watt.

CHAPEL AND TOWER, KING'S COLLEGE ABERDEEN UNIVERSITY.

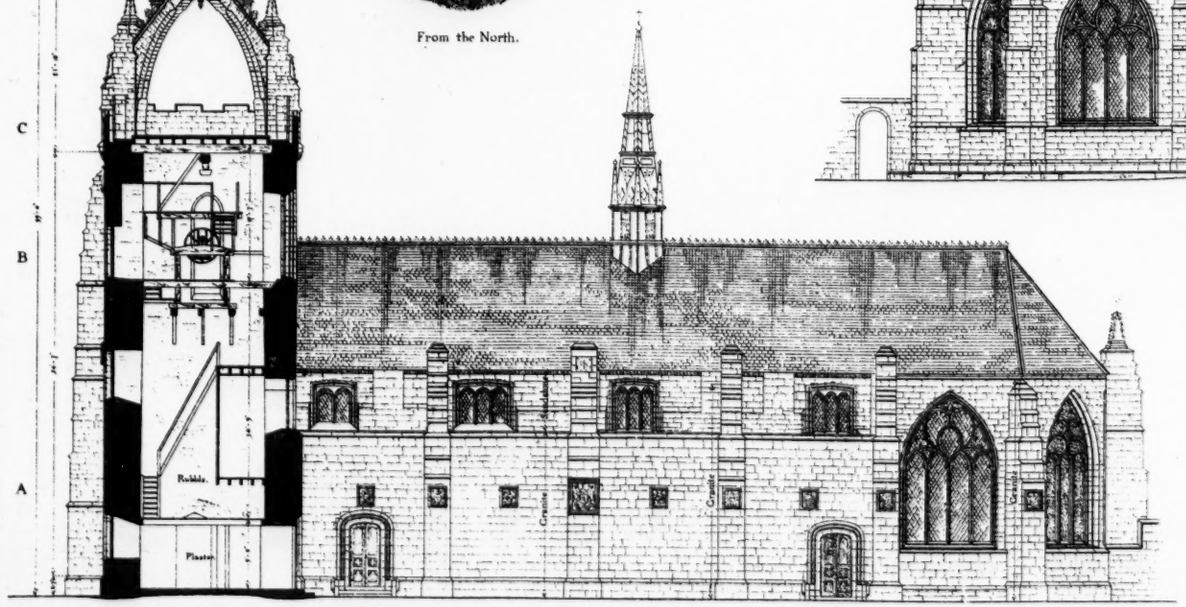


From the North.

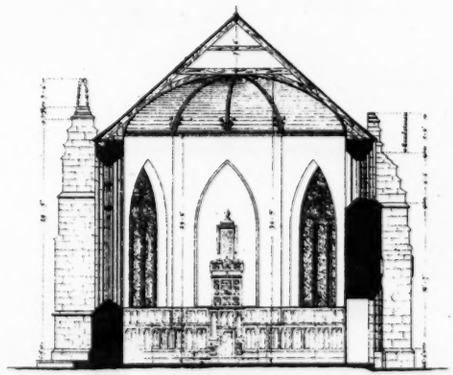
1. Moulding (granite)-coat of arms-S.Elev.
2. D. (sandstone)-small coats of arms-D.
3. D. (granite)-round doors-S.Elev.
4. String (sandstone)-North Elev.
5. Moulding (do)-round door-D.
6. D. (do) do. West Elev.



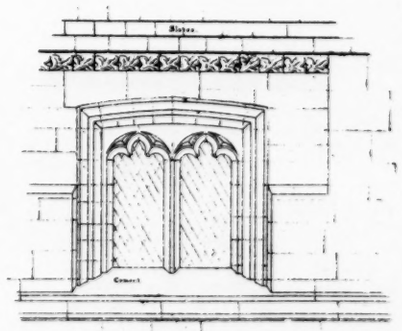
NORTH ELEVATION. (Sandstone)



SOUTH ELEVATION.



SECTION.



Window next Tower, South Elevation.

Scale for Mouldings.

Scale of Feet.

C F Kell Photo Litho London E.

R.I.B.A. Silver Medal Competition, 1885.
Medal of Merit and Premium Awarded.

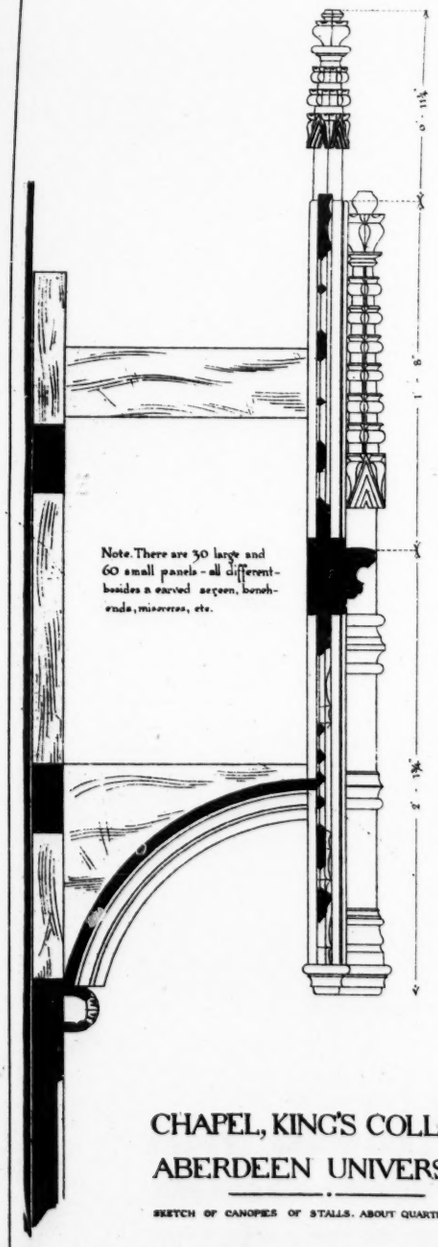
Measured and Drawn by Mr. James C. Watt.

GROTESQUES AT NOTRE DAME, PARIS.

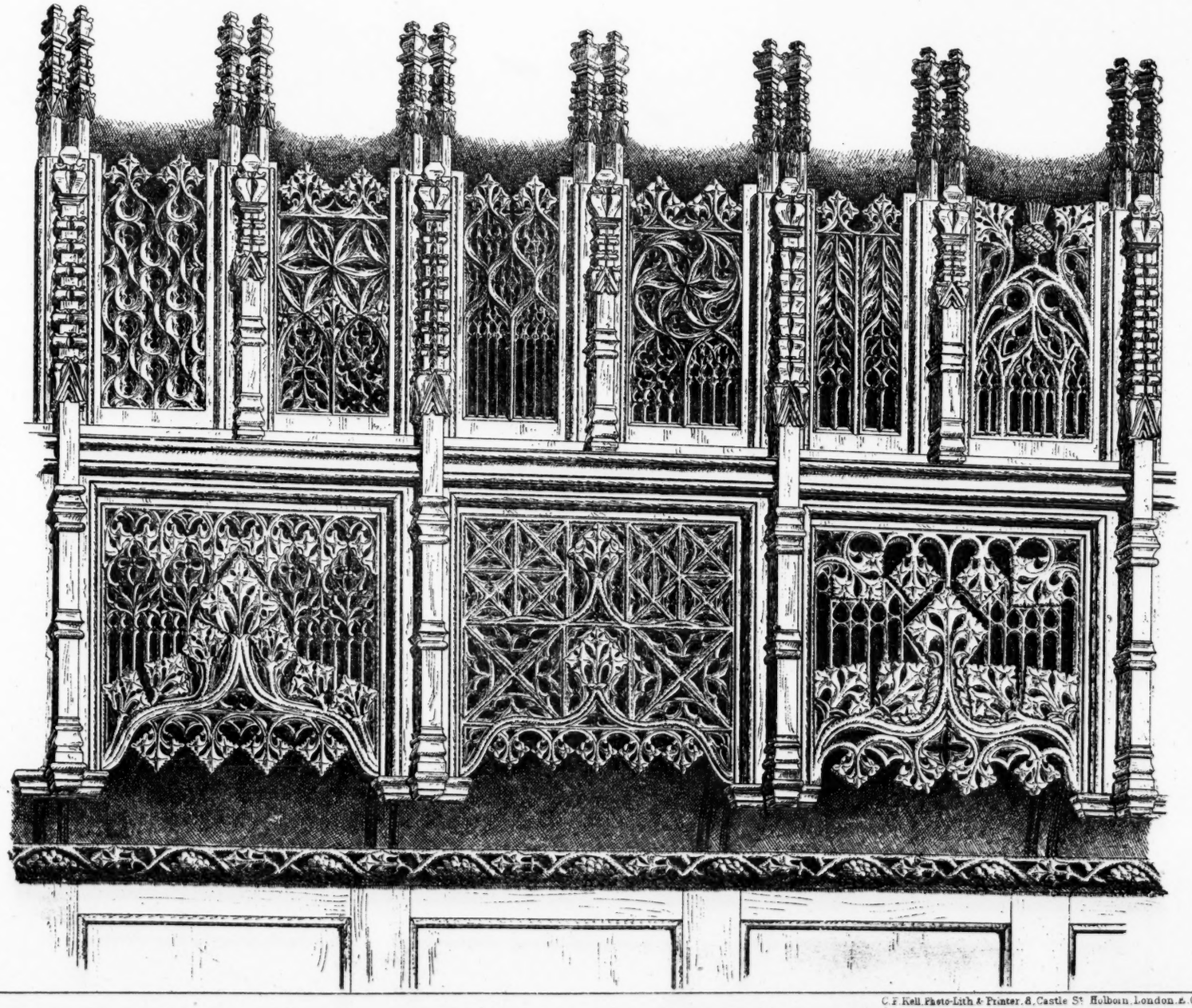
Drawn by Mr. Reginald T. Blomfield.

Wyman & Sons, Photo-Litho

Queen St London, W.C.



Note. There are 30 large and 60 small panels - all different - besides a carved screen, bench-ends, misereres, etc.



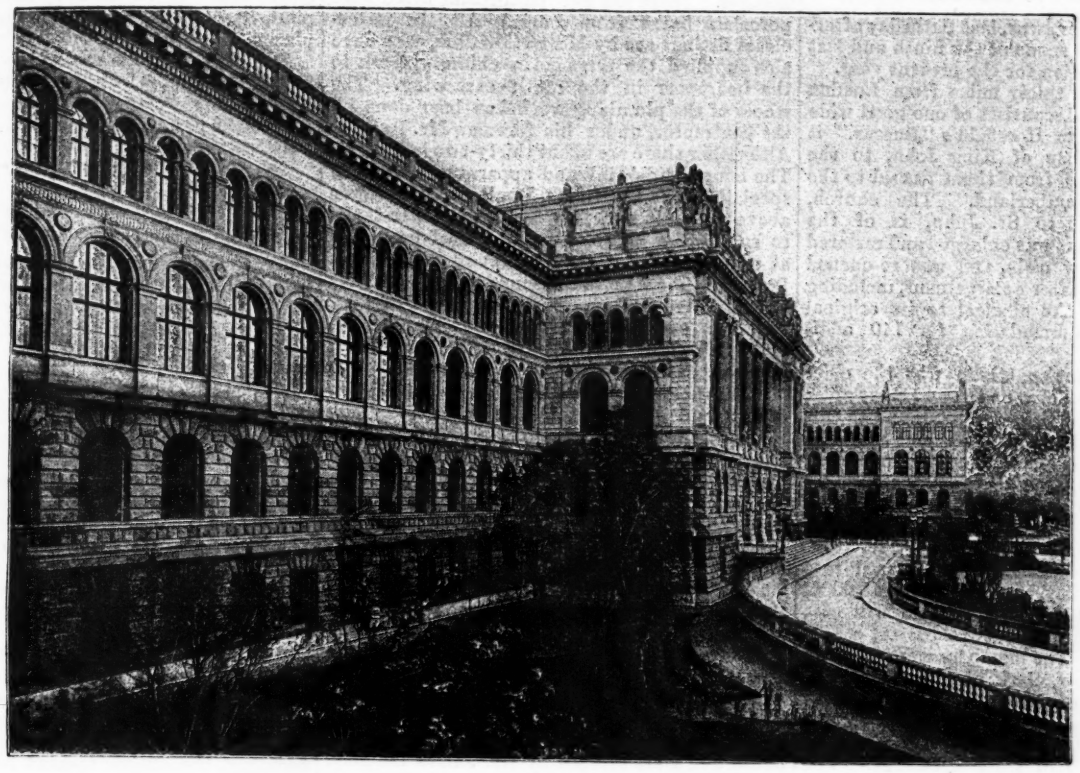
CHAPEL, KING'S COLLEGE
ABERDEEN UNIVERSITY.

SKETCH OF CANOPIES OF STALLS. ABOUT QUARTER FULL SIZE.

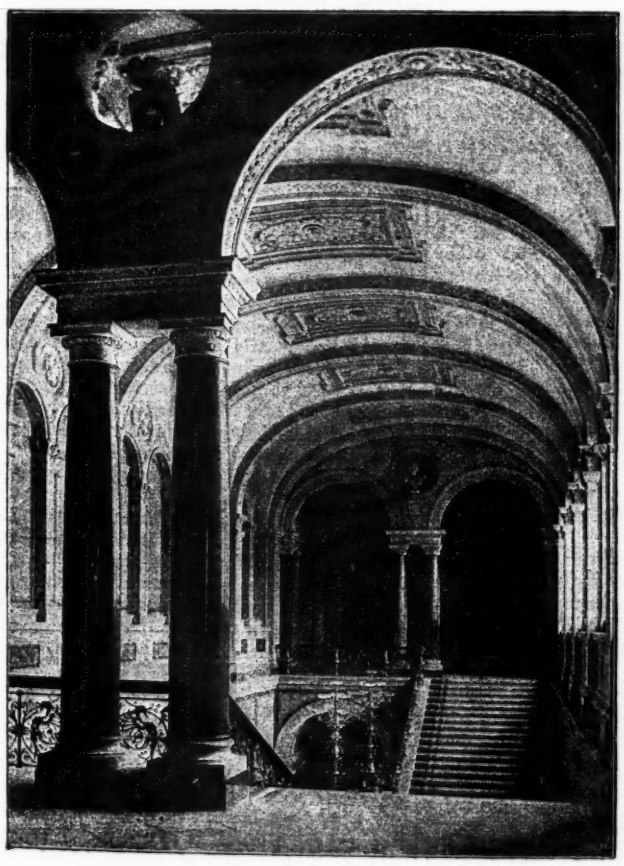
C. F. Kell, Photo-Lith & Printer, 8, Castle St. Holborn, London, E. C.

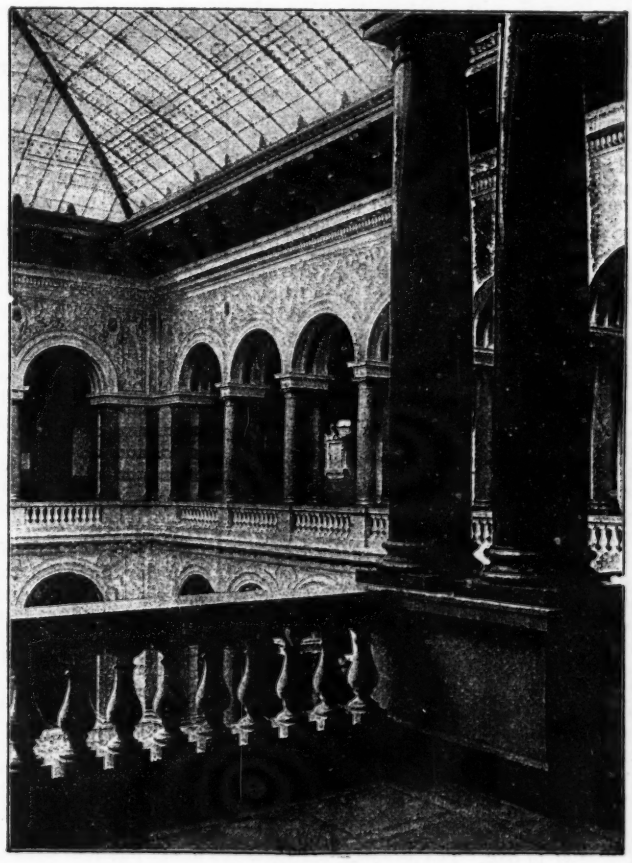
R.I.B.A. Silver Medal Competition, 1885.
Medal of Merit and Premium Awarded.

Measured and Drawn by Mr. James C. Watt.



Polytechnic School, Charlottenburg: Portion of Exterior.





Polytechnic School, Charlottenburg: Views in Principal Staircase.

THE NEW POLYTECHNIC SCHOOL AT CHARLOTTENBURG, NEAR BERLIN.

THE new home of the technical high-school of Berlin, in the creation of which three prominent architects, Messrs. R. Lucae, F. Hitzig, and J. C. Raschdorff, were one after another engaged, was inaugurated in the early days of November last. Neither the lately-opened university of Strasburg, nor that of Vienna, can compare in impressiveness with the mighty building which the professors of technique have erected in the German capital. It is quite the largest building in Berlin,—much greater in its dimensions than the palace,—and is erected on a part of the site, near the boundaries of the city, destined by Schinkel as that of the Charlottenburg-road racecourse. It lies, therefore, at the westernmost point of the Berlin Zoological Gardens.

Owing to the size of the building, as well as to its situation, no point is to be found from which the eye can grasp the façade as a whole. We print a small view which, taken from the left wing of the building itself, gives some idea of its length. We give also a couple of illustrations of the interior.

Both the principal front and the interior are richly decorated with sculpture. Thus, in the centre block are life-size statues of Schlüter and Leonardo da Vinci, and at the sides those of Watt, Stevenson, Bramante, and Erwin von Steinbach. In the great hall of the central building stand the five busts of Gauss, Schinkel, Liebig, Eytelwein, and Redtenbacher, and round the attic are eighteen life-size figures which represent the building trades, as, for instance, the joiner, the mason, and the carpenter.

ARCHITECTURAL ASSOCIATION.

EXCURSION TO CRAWLEY.

CRAWLEY, in Sussex, was, last Saturday afternoon, May 30th, the scene of the ninth and last visit of this Association for the present year.

Crawley, which is thirty miles from London on the Brighton road, consists of one good wide street. According to Horsfield's "Sussex," it belonged, in the time of King John, to the Poynings family, and from them passed to the Percys, of Northumberland. The church, which is dedicated to St. John, is of the Decorated Period, but was enlarged and restored in 1880 with a new aisle, and was re-opened July 1st that year, after enlargement, including the restoration of the chancel to its original length, giving accommodation for 140 additional sittings.

Buchan Hill Mansion, which was the chief object of the visit, is between two and three miles from Crawley on the Brighton road, and to this the members walked. The house is being built on the site of an old one now removed, for Mr. P. Saillard, of London, from designs by and under the superintendence of Messrs. Ernest George & Peto.

The works were commenced July 7th, 1882, when the original contract was entered into with Mr. Mark Manley, the builder, for 45,000*l*., but it is estimated that the mansion will cost about 55,000*l*. when finished, exclusive of coach-houses and stables. The members were received by Mr. J. G. Farrow, clerk of the works, and Mr. M. Manley, the contractor, and first escorted by them round the building. Externally the walls are faced with Lawrence's Bracknell red bricks, with Ham Hill stone dressings. The facing bricks were all specially made by Messrs. Lawrence & Son 2½ in. thick. The same firm also supplied all the rubbers used here.

The roofs are mostly covered with Gloucester stone slabs, and a small portion with Yorkshire stone. Having viewed the exterior, the members entered a large forecourt, one side of which is bounded by a tall wrought-iron enclosure and gates, manufactured by Messrs. Ellis & Rice, who have also supplied all the iron locks and wrought-iron hinges throughout the house. The mansion is entered from a carriage porch, and a lobby leads into the hall, which is 40 ft. by 28 ft. The entrance porches and vestibules are paved with mosaic, by Burke & Co., the conservatory being also paved with mosaic, by the same firm. The steps of the principal entrance are mosaic, and the risers are of vein marble. The large hall is oak-panelled to about 9 ft. high, the upper part being faced with the local Barnsnap stone; it occupies the height of the two stories. The corridors are also faced with oak dado, 9 ft. high, and local stone above. In the entrance-hall is a large hooded chimney (between lofty windows) of red Mansfield stone. The ceiling is hand-painted, by Mr. Malins, who has also executed all the hand-painted tiles in the bedrooms, &c. On one side of the hall are the drawing-room, morning-room, &c.

All the dados, doors, seats, &c., in the drawing-room are of solid rosewood, the two rosewood chimney-pieces in the same room being executed by Messrs. Christie. The morning-room is panelled with deal, 9 ft. high, painted ivory-white, the chimney-piece executed in carved deal to match. The ceiling of the dining-room is of oak, the carved beams being of solid oak, as likewise the dados and window-fittings. The tile hearths are by Messrs. Craven, Dunnill, & Co. The floors of all the principal rooms have oak flooring on 1-in. deal sub-flooring. Adjoining the offices, by the garden entrance, are a schoolroom, lavatory, &c.; also Mr. Saillard's private room, which is wainscoted in oak. The principal staircase is in the tower, and is entirely constructed of oak, the newels, 8 in. square, being carried up as posts; the treads and risers are cut out of solid oak, with moulded nosings and moulded soffits; carved oak open panelling being used as balustrading. All the stained and tinted glass is by Messrs. Lavers, Barraud, & Westlake.

The kitchen is spacious and lofty, and has an open roof with domed lantern-light for ventilation. The offices, ranged round a kitchen court, are all lined with white glazed bricks. The basement contains extensive cellarage, and here arrangements are planned for all chimneys being swept from below.

All the first-floor corridors have oak dados and doors, and the rooms have deal panelled dados and doors; the door brass furniture is by Farady & Co.

The lavatories and other sanitary fittings are by G. Jennings, of Lambeth. There is a lift to the top of the house by R. Waygood & Co., of London. There are five bath-rooms fitted with porcelain baths from Paris. All the water-closet fittings are by Messrs. Doulton, who have also supplied the terra-cotta chimneypieces to the bedrooms in the south-east wing. The whole of the plumbing work has been done by the contractor, under his foreman Mr. Parrett. Altogether there are about thirty-two bedrooms. The housemaids' sink and apparatus have been specially made by Messrs. Doulton. The tower above the main staircase has large water-tanks to supply the house. Mr. W. Chard has acted as general foreman to Mr. Manley, and Mr. A. Burton is foreman of masons; and Mr. Adams has officiated as time clerk. The stone carving has been executed by Mr. Christopher Smith and Mr. Walter Smith. Mr. Smith and Mr. Knox executed the modelling of ceilings.

The whole of the wood-carving throughout, of oak and otherwise, is by Mr. Knox. The electric bells are by Strode & Co. The heating-apparatus and all the stoves are supplied by Longdon. The house is to be lighted by gas and electric light, both by Messrs. Strode. The kitcheners and hot-plates are supplied by Messrs. Benham & Sons, London. The butler's pantry is fitted with a strong-room, by Milner. "Tobin's" system of ventilation is used throughout. The mortise and other locks, not mentioned, are by Milner. The paper-hangings have been mostly supplied by Messrs. Woollams and Messrs. Jeffrey. The iron casements are by Messrs. Pearce & Co. The mansion is to have a terrace to the garden front, which is now in course of construction. The stables and coach-house, &c., were erected by Mr. James Longley, builder, of Crawley, from designs by the same architects, and cost about 8,000*l*. They consist of stalls for twelve horses, and eight loose and sick boxes, with harness-rooms, lofts, &c. The fittings were made and supplied by Messrs. Musgrave & Co.

ARCHÆOLOGICAL SOCIETIES.

London and Middlesex Archæological Society. A general meeting will be held at Tallow Chandlers' Hall, Dowgate-hill, on Tuesday next, June 9th, at 1.30 precisely. Mr. Edwin Knight, Master, has consented to preside. A description of the hall, records, and other matters of interest connected with the history of the company, will be given by Mr. M. F. Monier-Williams, clerk. The meeting will subsequently adjourn to the Church of St. Lawrence, Jewry, where an account of the building and the interesting series of parochial records will be contributed by Mr. Louis Stokes. A visit will next be made to Guildhall, for the purpose of inspecting the library and museum; likewise the New Council Chamber, and other recent alterations, also the crypt, some observations upon which will be made by Mr. Alfred White, F.S.A.

St. Paul's Ecclesiological Society. — This Saturday, June 6th, the members of this Society will visit Chaldon and Merstham. Papers will be read by Mr. J. G. Waller, F.S.A., on the Wall Painting at Chaldon; and by Major Heales, F.S.A., and Mr. W. Bolton.

British Archæological Association.—Under the presidency of the Duke of Norfolk, E.M., the forty-second annual congress of the British Archæological Association has been fixed to take place at Brighton on the 17th of August next, and following days to the 24th inclusive. By the kindness of the Mayor and Corporation of Brighton some of the principal rooms of the Royal Pavilion have been placed at the disposal of the association during the week's proceedings, and there will be excursions to Arundel, Chichester, Goodwood, Cowdray, Bognor, Boxgrove, Worthing, Bosham, Wiston, Steyning, Bramber Castle, Amberley Castle, Hollingbury Copse, and other places of interest in South Essex. There will be extra days arranged for the following week, and which will probably include excursions to Lewes, Seaford, Eastbourne, for Hurstmonceaux Castle, Pevensey Castle, and Hastings; a visit, it is also expected, will be made from Newhaven to Dieppe, under the auspices of the Leland Club.

Oxford Architectural and Historical Society.—A deputation from this Society visited Guildford on the 30th ult. to inspect the places and objects of interest. They were met by the mayor (Mr. Councillor Mason) and other gentlemen, and proceeded to the Town-hall and inspected the corporation plate. A paper was read by Mr. D. M. Stevens at the Town-hall, and the party afterwards visited Archbishop Abbott's Hospital, St. Mary's Church, the Castle, and other places.

Somersetshire Archæological and Natural History Society.—The annual meeting will be held in August, at Weston-super-Mare, under the presidency of Mr. E. H. Llewellyn.

PORTLAND CEMENT.

SOCIETY OF ENGINEERS.

AT a meeting of the Society of Engineers, held on Monday evening, June 1st, at the Town-hall, Caxton-street, Westminster, Mr. Charles Gandon, President, in the chair, a paper was read by Mr. Henry Faija, on "Portland Cement."

The author said that, though much had been written on the subject, little was generally known, and contradictory conditions were often specified. He considered that the weight test is of little or no value to the purchaser, though it has a use for the manufacturer.

Specifications should be as simple as possible, and the author advised the adoption of the ordinary quality of cement, obtaining the different strengths required by varying the proportion of sand or aggregate, in preference to specifying unusual qualities.

The only points which need to be tested are,—fineness, tensile strength, soundness. After defining the degree of fineness which he considered most desirable, having regard on the one hand to strength, and on the other to economy, the author treated in detail the subject of testing. Experience showed that cements which set rapidly attain their full strength in a few months, and have then a tendency to fall off, while a slow-setting cement continues to increase in strength for an indefinite period. The best practice is to test the briquettes at three days after moulding, and again at seven days. At the former period they should not break under 175 lb. strain, or at the latter under 350 lb.

The author exhibited and described a machine that he devised some years ago, and had successfully used since, for gauging cement; also a testing machine, specially arranged to give the most advantageous rate of speed in applying the pressure, which he found to be 100 lb. per 15 seconds.

It was by no means safe to assume that, because a cement bore the required tensile tests, it was necessarily sound, and some cements were long in showing unsoundness, or "blowing." Means were, therefore, described by which this quality could be ascertained at as early a period as possible, by being artificially developed in an apparatus designed for that purpose.

A form of specification, founded on experience in these several respects, was then given, and the paper concluded with some reference to the chemical tests for purity, introduced in German practice by Dr. Fresinius, and with the author's testimony to the freedom of English cements from the adulteration against which these tests were intended to guard.

MAGNETO-INDUCTOR AND BRIDGE FOR TESTING LIGHTNING CONDUCTORS.

As the efficiency of a lightning-conductor depends chiefly on its electrical resistance being low, a good conductor should not have more than 10 ohms from the apex of the rod to the earth-connexion, inclusive of the resistance of the latter; and exceptionally good conductors have only one-half of this resistance.

A high resistance is due either to flaws and breaks in the conductor, or to a bad and faulty earth-connexion. Defects of this kind cause a conductor to become a positive danger to a building, because discharges of atmospheric electricity frequently find a path to earth through some part of the building itself, of less electrical resistance than that of the faulty conductor.

The testing of lightning-conductors from time to time is therefore of paramount importance, as it is only by this means that any increase in their electrical resistance can be ascertained. When the tests show that the resistance becomes greater, it is evident that there is a fault in some part of the conductor; this fault must be found at once and removed.

Messrs. Siemens Bros. & Co., of 12, Queen Anne's Gate, Westminster, have designed a testing apparatus which admits of its being manipulated by workmen of ordinary intelligence; in fact, the instrument itself and the connexions to be made with the conductor are of such a simple kind that no special electrical knowledge is required for the work.

A perspective view of the apparatus is shown in fig. 1. The galvanometer is represented as ring of German silver wire (forming the A and B branches of a resistance bridge), a contact-lever, P, which can be moved over the ring and used as a battery-key; a small horizontal galvanometer, G, four terminals, b, b^1, f, and c, and R the comparison resistance of the bridge. A small key, K, is fixed to terminal l, and the resistance, R, is underneath the bridge-board. A leather bag at the side of the wooden case (see fig. 1) is for holding the double conductor

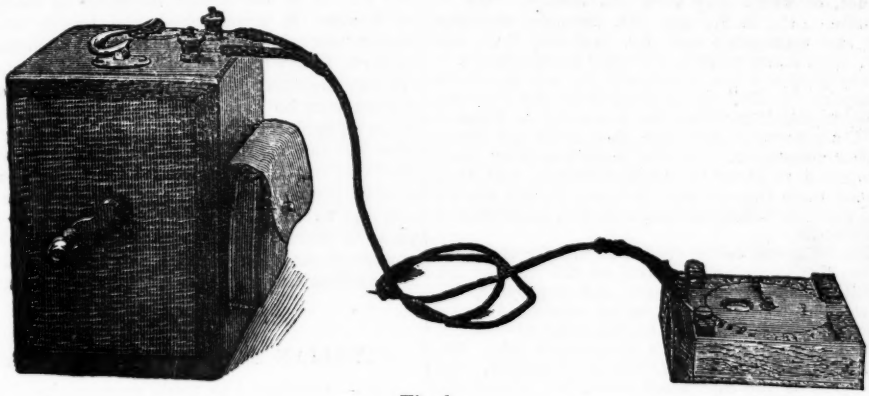


Fig. 1.

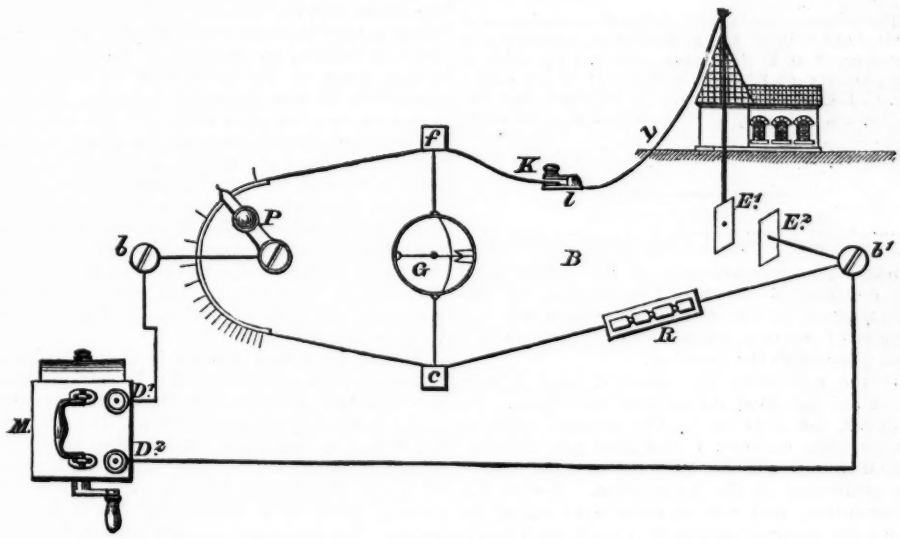


Fig. 2.

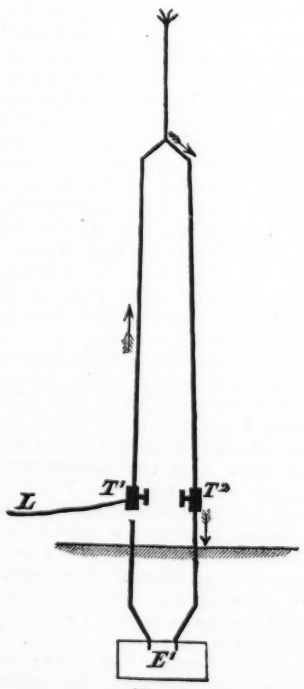


Fig. 3.

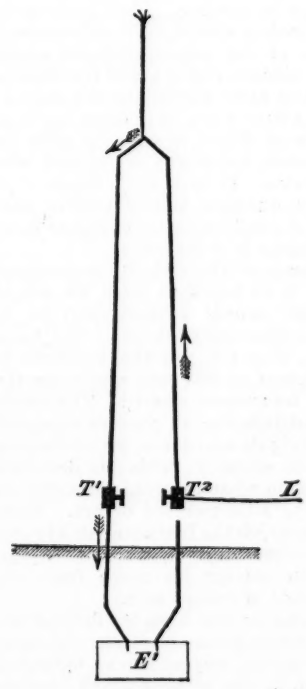


Fig. 4.

removed from the compartment provided for it in the bottom of the case containing the magneto-inductor, and is in connexion with the terminals of the latter. Fig. 2 is a general plan, showing the connexions between the inductor, bridge-board, two earth-connexions, and the lightning-rod. The apparatus consists of a magneto-inductor, M, enclosed in a wooden case, and a bridge-board, on which are fixed a leading-wire, which is used for connecting the magneto-inductor terminals with the bridge-board. The weight of the complete apparatus is 9 lb., and the dimensions are about 6 in. by 6 in. by 9 in.

By means of this testing-instrument, the electrical resistance of lightning-conductors and earth-connexions can be measured, the range of the instrument being from 0.01 ohm to 500 ohms. The measurement of a resistance is read off direct without the trouble of making any calculation.

The connexions for testing are made as follows:—

Terminal l (see fig. 2) is joined to the apex of the lightning-conductor by means of a length of leading-wire, which may be either bare or insulated.

Terminal b^1 is put to earth, that is, a connexion is made by means of a stout piece of copper wire between this terminal and a gas or water pipe, or, should these not be at hand, any metallic body in intimate contact with wet earth may be used in place of the pipes. When no such earth-connexion is available a special copper plate (E^2) must be employed and put underground at such a depth as will insure all parts of the plate being in good contact with moist earth.

Terminals b, b^1 are joined to D^1, D^2 of the inductor by means of the double-conductor leading-wire. The bridge-board must stand as far away from the inductor M as the leading-wire will permit, so that the galvanometer G may remain as much as possible out of range of the magnetic and inductive influence of the permanent magnets and revolving armature of the inductor.

After the galvanometer needle has been set free, the bridge-board must be so placed that the needle plays freely over the scale, and finally points to zero when at rest. All connexions must be firmly made, and the attachments of the earth wires to a water-pipe, gas-pipe, &c., should be well soldered.

The tests are taken by two persons; one at the inductor and the other at the bridge-board. Whilst the handle of the inductor is turned, the key, K, of the bridge-board is depressed with one hand, and the pointer, P, with the other. The current from the inductor then traverses the bridge, and a deflection of the galvanometer-needle is produced; the key, K, still held down, and the pointer, P, kept depressed and moved a little to the right and left, observing, at the same time, which of these movements causes a decrease of the deflection. As soon as this is ascertained the pointer is kept moving slowly around the German silver ring until a point is found which brings the galvanometer-needle back to zero. The figure over which the pointer, P, now rests gives in ohms the total electrical resistance of the lightning-conductor and its earth-connexion, leading-wire between the apex of conductor and terminal l, and earth-plate E^2.

The resistance of the leading-wire L and earth-plate E^2 is so low that it may be neglected; the tests, therefore, can be taken as showing the actual resistance of the lightning-conductor and its earth-connexion E^1. A resistance of more than 20 ohms shows the conductor to be in such a state as to have become a positive danger to the building to which it is fixed.

At the time a lightning-conductor is erected one end of a length of copper wire should be firmly soldered to the apex of the conductor. This wire is carried down loosely by the side of the conductor, and remains permanently in position so as to be available for connexion with the testing-instrument whenever the entire length of the conductor has to be tested. By this means the trouble and expense of attaching a fresh leading wire for every test are avoided.

A fault in a lightning-conductor is usually due to a bad earth-connexion arising from partial or entire fracture of the conductor just above or below the ground-line. In some cases, the lower end of the conductor is in dry ground and in others the earth-plate is either too small or is oxidised and broken. The earth-connexion should, therefore, be tested first of all, and for this purpose a strong brass clamp with a terminal screw should be secured to the conductor just above the ground-line and well soldered. A separate short length of leading-wire is then used for connecting terminal l of the bridge-board with the terminal screw on the lightning-conductor.

Double rod conductors, as shown on figs. and 4, of the same, or a greater sectional area a a single one, can be erected, and the testing of conductors of this kind is very readily carried out. The upper end of each rod is well soldered to a joint common to both rods, and at the base the two ends terminate just above the ground-line. To the earth-plate E^1 are soldered two rods, which terminate close to the upper ones, and are joined thereto by means of connexion-screws T^1 and T^2. Either of these screws can

be connected to the testing instrument by a leading-wire.

To test such a twin-conductor one rod at T^1 (see fig. 3) is disconnected and joined to one end of the leading-wire, the other end being connected to terminal *l* of bridge-board (see fig. 2). The test is then made, as described in the case of single conductors, and the continuity of the right-hand rod tried. The left-hand rod is tested in the same way, after the connexions have been made, as shown in fig. 4. In erecting a double conductor the two rods must be kept some distance apart throughout their entire length, and not touch any piece of metal forming part of the building, so as to obviate all risk of the two rods being short-circuited. After the tests have been taken, the connexions must, of course, be re-made, so that the continuity of the rods is uninterrupted.

The testing of lightning-conductors should be carried out in dry weather, as better and more concordant results are obtained than in a damp state of the atmosphere, when buildings are covered with moisture.

There can be no doubt that a considerable number of lightning-rods, which are supposed to protect their buildings against destruction from lightning, are in a very unsatisfactory state with regard to electrical continuity, and many are doubtless rather a source of danger than a protection, as, while they attract discharges of atmospheric electricity they are unable to conduct the same harmlessly to the earth as they are supposed to do, and the building is therefore endangered. Lightning-rods can only be considered safeguards if their electrical resistance is kept low, and in order to be sure of this it becomes necessary to have them tested from time to time.

CHEAP, IF NOT EXPEDITIOUS, BUILDING.

CORDERY *v.* BOTTING.

THIS was a case recently heard in the Windsor County Court before Judge Wigham. According to the report in the *Windsor and Eton Express*, from which we quote, the plaintiff claimed 30*l.* penalty under a building contract. Mr. G. H. Charsley appeared for the plaintiff, and Mr. C. F. Dean for the defendant.

The plaintiff, Jonathan Cordery, lives at Stoke Poges. Botting is a carpenter at Slough, and he entered into a contract on the 8th of July, 1884, to build three cottages at Stoke for the plaintiff. The amount was to be 217*l.*, and it was agreed the work should be commenced from the date of the signing of the contract and completed within twelve weeks, the defendant to forfeit 2*l.* a week for every week they were unfinished after that date. It was further agreed that Mr. H. Sargeant, of Slough, should act as umpire, and that his decision should be final in case of dispute. The plaintiff now claimed 2*l.* a week for fifteen weeks during which the cottages were unfinished, and said that he had to get some one else to finish them.

Mr. Dean contended that this dispute ought to have been referred to Mr. Sargeant, in pursuance of the terms of the agreement; but his Honour thought that the question of penalty was separate and independent. He, however, asked Mr. Sargeant's opinion on the matter, and Mr. Sargeant thought the time allowed for the completion of the work was a reasonable one, but considering the low price at which the contract was undertaken, he did not think the full penalty ought to be exacted. He thought 300*l.* would have been a fairer estimate for the work.

Mr. Dean submitted that the damages, if any, should be put at the amount of the rent which the cottages would have produced if they had been completed at the proper time. The rent of each cottage was 3s. per week. That was 9s. a week for fifteen weeks, 6*l.* 15s. He contended that the penal sum was reducible according to the actual damage. This contract, he said, had ruined Botting, and he was now offering his creditors half his weekly earnings to save the expenses of bankruptcy.

His Honour gave judgment for the plaintiff for 10*l.*

The Hotel Metropole.—It should have been mentioned, in the account of this building which we published last week, that the wrought-iron wine-bins and the cellar fittings, &c., were supplied by the well-known firm of Farrow & Jackson, of Great Tower-street, who, as will be known to many of our readers, have for a great many years given special attention to such details.——Messrs. R. S. Newall & Co., of the Strand, write to say that their system of copper-rope lightning conductors was adopted, and the work of fixing carried out, by them.

COMPENSATION CASE.

UNIVERSAL MARINE INSURANCE COMPANY *v.* THE CITY COMMISSIONERS OF SEWERS.

A HEAVY claim for compensation for City property came before Sir Thomas Chambers, Q.C., M.P., Recorder, and a special jury, at the Guildhall, on Monday last, the Universal Marine Insurance Company claiming from the Commissioners of Sewers of the City of London upwards of 50,000*l.* for freehold premises, Nos. 72 and 72A, Old Broad-street, of which they were the owners. Mr. E. Clarke, Q.C., M.P., and Mr. Bremner appeared for the claimants; and Mr. Webster, Q.C., and Mr. Rose-Innes represented the Commissioners.

The property was purchased by the Insurance Company in 1867 for 13,000*l.*, with the intention of occupying it as offices, but it was let on lease at 256*l.* a year until 1884, and they could not obtain earlier possession. In the meantime they were compelled to move to other premises, and they placed their Broad-street property in the market and gave the Commissioners of Sewers intimation of the facts.

The witnesses called on behalf of the claimants were Mr. Perry St. Quintin, of the firm of St. Quintin & Son, auctioneers and surveyors, 37, Threadneedle-street, who, on an estimated rental value of 2,000*l.*, fixed the capital value at 45,900*l.*, including 10 per cent. for compulsory sale; Mr. Bousfield, of the firm of Fox & Bousfield, who agreed as to the capitalised value, but placed the rental at 2,250*l.*; and Mr. Farmer, of the firm of Debenham, Tewson, Farmer, & Bridgewater, whose valuation was 47,850*l.*

The evidence on behalf of the Commissioners of Sewers was that of Mr. E. N. Clifton, architect and surveyor, East India-avenue, who put the value of the property at 33,000*l.*, inclusive of 10 per cent.; Mr. C. J. Shoppee, who made it 33,990*l.*; and Mr. G. Barnes Williams, who considered it to be worth 35,640*l.*

The jury returned a verdict for 41,911*l.* 13s. 4d.

THE ARCHITECTURAL ASSOCIATION.

SIR,—The adjournment of the debate upon the question of doubling the amount of the subscription to the Association gives me the chance of writing what I meant to say had I been present at the meeting.

If the resolution be passed, I hope it may effect all the good its authors anticipate. If, however, the criterion be the greatest good to the greatest number, I fear that the contemplated change will diminish rather than extend the usefulness of the Association. Double the subscription, and you at once weed out of its ranks the poorer students, who must need study proportion in money matters, though they may rarely find it in the architectural designs they spend their days in tracing. That the bounds of this useful society should be thus narrowed by the exclusion of the poorer students would be a matter for sincere regret; and the change would appear the more significant and regrettable coming at a time when, in another realm of art, the College of Music is opening wide its doors to the poorest lad or girl in the land who has musical genius. It is well, I think, that this side of the question should receive consideration even if great gains are expected from the proposed change in other ways.

If, indeed, the sum of 300*l.* (which I understand is the amount it is hoped to raise by means of the increased annual subscription) be so necessary to the effectual working of the Association classes, why not get the Institute to make a yearly grant of this sum and leave the subscription at its present figure? The ample funds of the Institute are at present expended in guarding the rights and decencies of the profession; but this scarcely fulfils his Britannic Majesty's intention when he granted its charter expressly for the advancement of art. Here, then, is a way in which the Institute can advance the study of architecture, and, at the same time, do something to redeem its name from the deserved contempt of honest men.

And it seems to me the bounden duty of the Institute to help this school of young architects in some such practical way as I have indicated. Is it not written in the articles which bind the pupil to the service of the F.R.I.B.A. that the indulgent master shall allow the pupil "all reasonable facilities" for attending classes at the Architectural Association or other kindred institutions? Why, then, should not the Fellows of the Institute contribute (at least indirectly) to the sustenance of a needy educational society which gives to their pupils that knowledge of architecture which they themselves are continually paid a good round sum to teach?

JOHN D. SEDDING.

CURVES OF CONTRARY-FLEXURE.

SIR,—In an article in the *Builder* for May 30, p. 752, Mr. Cave Thomas describes what he is pleased to term "Curves of Contrary-Flexure," made by joining two arcs of circles or ellipses together. These, however, do not form the true curve of contrary-flexure as understood by mathematicians, in which the curvature gradually decreases, or the length of the radius of curvature increases as the point of flexure is approached, the length of the radius becoming infinite at the point of contrary-flexure. In my treatise on "Practical Geometry for the Architect, &c.," I have shown how such curves can be drawn, and applied to the purposes of architecture, as in forming the ogival arch or the mouldings called ogee. By using the true mathematical curve of contrary-flexure a more pleasing contour is obtained than in the attempt to imitate it by putting together two parts of circles or ellipses, as in the former the change of curvature is gradual, while in the latter it is sudden and abrupt. E. WYNDHAM TARN.

ITALIAN SILVER-GREY SLATES.

SIR,—Accident has made me acquainted with efforts which are being made by enterprising Englishmen to develope some of the industrial resources and the natural products of Italy. I think it may interest some of your readers to hear, in outline, an account of one such effort which came to my knowledge as a stranger travelling in this favoured country. I write, however, as a traveller only, and not as a man of business; and I may premise that I have no interest in the undertaking, though I heartily wish it success. In the interests alone of Italy, I think that what I propose to say should be more widely known than at present the matter would seem to be known in England; for there are those acquainted with the conditions of the slate trade who think, that the Italian importation will seriously affect the English slate market of the future.

Inland from, and far up in the hills above, Chiavari, on the shores of the Eastern Riviera, are situated certain rich slate quarries now being worked by an English firm. The products are carted to that town, whence they are transferred to the small, but deep and safe, harbour of Santa Margherita, Ligure, some eighteen or twenty miles from Genoa, by means of local boats. The slates are shipped abroad from the last-named port, which is the centre of the slate trade of this part of Italy. Owing to vessels requiring ballast for England, on their return voyage from Mediterranean ports, the slates can be loaded at almost nominal rates of freight, viz., from 3s. to 4s. a ton to Cardiff, and from 10s. to 12s. a ton to Liverpool or London. The actual prices of the different sizes and thicknesses of the slates, it is impossible to give in brief; but this is of the less moment as I desire to direct attention in general terms, rather than with mercantile exactness to the subject matter of this letter. It may be said, however, that these Italian slates can be delivered in England at a cost some 20 per cent. cheaper than the price of similar slates of the best quality, at the quarries in Wales; whilst the cost of carriage from the quarries in Wales makes the difference in the percentage still greater. As to the respective qualities of the Welsh and Italian slates, I am unable to speak from knowledge, but this can be easily tested; and I gather on the spot that the Italian are, at the least, equally good with the Welsh slates, and in some particulars they are even superior. They certainly gained the first prize at the Turin Exhibition last year; but I know not if Wales competed at Turin. Any way, the following are some of the virtues of the Italian slates. They can be obtained, I am told, of far larger dimensions than the Welsh. They harden, until they become like stone; and, twenty-four hours after quarrying, they cannot be split, and can hardly be broken. Of a blue colour at first, they become, on exposure, a silvery-grey colour or white, and they turn to a uniform hue. They are non-conductors of heat and cold, and thus are specially suitable for roofing purposes, the houses for which they are used being cooler in summer and warmer in winter. Lastly, the cleavage of the slates is said to be nearly perfect, the percentage of breakage being far less than that of English slates; and in use their wear is very durable. Besides

being suitable for roofing purposes, smaller sizes make excellent slates for schools, and larger ones are widely employed as "black boards" for classes; and both these have already acquired a reputation in England. Slabs are also cut for making chimney-pieces, tops of washing-stands and chests of drawers. For mural decoration, in a damp climate, they will (I imagine) prove of value for decorative purposes, when enamelled and painted; and for the beds of billiard-tables in one slab, dressers in kitchens, counters in certain shops, and other uses, they will be invaluable. They would also seem to be serviceable for railway stations, docks, warehouses, sheds, outhouses, and houses of a single story. I will only add, that the quarries above Chiavari are now being worked by Messrs. Bubb & Co., of Santa Margherita, Ligure; and that machinery for developing the resources of these quarries more speedily and effectively, which will be worked by steam power, is now on its way from England.

AN ENGLISH TRAVELLER IN ITALY.

THE PARAGON THEATRE, MILE END ROAD.

SIR,—In the description of the above in your issue of the 23rd ult. [p. 748], I see it stated that the whole of the decorative plastering was executed by the Framemakers and Gilders' Association. This is not correct, as, with the exception of the auditorium, the plastering was executed by me.

T. HIBBS.

150, *Hertford-road, Dalston, N.*

PROVINCIAL NEWS.

Newcastle.—The Newcastle-on-Tyne local newspapers record that at an adjourned meeting of their City Council, held on May 15th, it was reported to the council that the Justices of the city had decided to considerably extend the City Lunatic Asylum at Coxlodge, near Newcastle; and that they had accepted the tender of Mr. Walter Scott, contractor, Newcastle, the amount being 22,041*l.* Mr. Arthur B. Plummer, A.R.I.B.A., of Newcastle, is the architect for the work. The matter was referred to the finance committee of the corporation to consider the best means of procuring the funds for the execution of the work, and to report thereon to the council.

Loughborough. — The Loughborough Local Board have elected Mr. George Hodson, C.E., as their chairman. Mr. Hodson was formerly their Surveyor and Waterworks Manager.

Stoke-sub-Hamdon (*Somersetshire*).—A new post-office has been opened in this village. The new building, which has been erected from plans and specifications prepared by Mr. H. Hall, F.R.I.B.A., London, is of Ham Hill stone. The interior of the office is semi-octagonal in form. The windows are partially fitted with thick crystal glass, and impart a good light to the office. The floor is paved with encaustic tiles, which were laid by Messrs. Webb & Co., Euston-road, London. The contractor was Mr. F. Fane, of Stoke.

Southport.—On Saturday last, May 30, the Mayoress of Southport (Mrs. Pilkington) laid the memorial-stone of a new children's ward now in course of erection in connexion with the local infirmary and dispensary. The new building, which will be known as the Pilkington Ward, and which is being constructed by Messrs. Fairbridge & Hatch, of Birkdale, from the designs and under the superintendence of Messrs. Mellor & Sutton, architects, Southport, will accommodate nine cots, allowing each a cubical air space of about 1,045 ft. The cost of the building will be about 700*l.*

Exeter.—At a meeting of the Exeter Town Council, acting as the Urban Sanitary Authority, on the 27th ult., it was resolved to purchase premises in North-street, formerly known as the George Inn, at a cost of 2,700*l.* with a view to further carrying out the street-line which was some time ago adopted by the Council. It was also decided to offer Mr. Faulkener White the sum of 2,500*l.* for the Phœnix Inn and adjoining property in Goldsmith-street. Upon the report of the City Surveyor (Mr. Donald Cameron) the Council decided upon the construction of a new sewer in the place of that now known as the Larkbeare Sewer, owing to the defective condition of the latter. The estimated cost of this undertaking is about 1,400*l.*

Standon.—The ceremony of placing the memorial stone of the Farming Home for Waifs and Strays, now being built in the parish of Standon, Staffordshire, took place on the 27th ult. The institution is in connexion with the Church of England Central Society for Providing Homes for Waifs and Strays. This Staffordshire home owes almost everything to the generosity of Miss Anderdon, sister-in-law of Mr. Thomas Salt, M.P. for Stafford. Miss Anderdon has given the site and 2,000*l.* for the building, and 50 acres of land, about equally divided between arable and pasture, has been leased on easy terms from Mr. Salt. The intention is to train outcast boys in farm-work, and afterwards send them to the colonies. Accommodation will be provided for fifty boys. Mr. E. Hoole, 104, Russell-street, W.C., is the architect, and the building is being carried out by Mr. W. T. Moss, of Stafford.

Sandown (*I.W.*).—A new Oddfellows' Hall, erected by the "Loyal Culver" Lodge, M.U., has just been opened at Sandown Isle of Wight. Mr. S. G. Tomkins was the architect, and Mr. C. Bennett the builder.

Chelmsford. — The Chelmsford Board of Health, having recently purchased six acres of land for a new cemetery, have resolved to lay out half of it first, and to erect the necessary buildings, &c., at a cost of about 2,000*l.*, from plans prepared by the Surveyor to the Board, Mr. C. Pertwee.

Blackburn.—Messrs. Neill & Sons, contractors, of Manchester, have just begun the work of erecting a new passenger station at Blackburn, for the Lancashire and Yorkshire Railway Company, who are spending 100,000*l.* on the station and the site, in addition to erecting a new bridge of 140 ft. span, and doubling the width of the railway for a distance of two miles.

CHURCH-BUILDING NEWS.

Edale.—On the 22nd ult. Lord Edward Cavendish, M.P., laid the foundation-stone of a new church at Edale, Derbyshire. The old Edale Chapel was originally erected in 1633, and was rebuilt in 1812. This had become too small and antiquated for the present requirements of the parish. The new building is to be Early English in style, and is to consist of nave, 54 ft. by 24 ft. 6 in. wide, with porch, chancel, and vestry, a tower and spire, 88 ft. in height, the lower part of the tower serving as the organ-chamber. The church will be fitted up with open benches, to accommodate 200 persons, and is being built of stone from the neighbouring quarries, with open-timber roofs of pitch pine. Mr. W. Dawes, of Manchester, is the architect, and the contract has been let to Mr. Thomas Beck, of Matlock Bridge, for 1,314*l.* Other works bring the total cost up to about 2,858*l.*

Gedding.—The parish church here has just been re-opened, after restoration under the supervision of Mr. Bisshopp, architect, Ipswich. A few months ago the nave was a melancholy ruin. The tiles had been mostly stripped off the roof, leaving the exposed timbers to decay. Mortar from the walls, and rubbish from the plastered ceiling, lay in heaps among the ancient low oak benches and the modern high deal pews. The roof, a good specimen of fourteenth-century work, is of oak, and every available bit of the old timber has been worked up in its restoration. It is covered with red tiles, ancient and modern, intermixed. The removal of the patch-work stucco from the outside walls disclosed excellent flint work on every face, with two Norman loopholes in the nave, and a curious lepers' grating in the chancel, which carry back the date of the foundation to the twelfth century. These have been glazed in the antique style, and the walls properly pointed, to display the original flint facing throughout. A new buttress on the north side of the nave, with new doors both north and south, complete the external renovation, and make the building structurally sound, dry, and warm, a result to which an open brick drain all round will contribute very materially in the future. Internally the walls have been smoothly refaced, and the stonework cleared of green mould and whitewash. The huge "three-decker" was of necessity removed, together with the large parlour pews that barricaded the poor from rich, choked up the nave, and greatly limited the accommodation. The floor is laid with solid wood blocks on a concrete bed, leaving a 4-ft. central passage paved with red tiles, flanked by white brick. The whole of the work has been carried out by Mr. Robert Tooley, contractor.

Nottingham.—St. Mary's Church has just been enriched by the completion of a reredos and chancel screen, the gift of Mr. T. Hill, J.P., in memory of his wife. The works are from designs by Messrs. Bodley & Garner, architects, Gray's Inn-square, London. The screen, which stands at the entrance to the chancel, is of English oak, and in the Perpendicular style. The work has been done by Messrs. Rattee & Kett, of Cambridge. The reredos is of wood, carved by Mr. McCulloch, of Kennington-road, London, and is entirely covered with gilding and colour, the work of Mr. Powell, of Lincoln. It is over 20 ft. high, and contains eleven pictures from the studio of Messrs. Burlison & Grylls, of Newman-street, London. The coverings for the altar have been worked by Mrs. Henry Gee, from the designs of the architects, and have been made up, along with the rich side hangings, under the supervision of Messrs. Watts & Co., London.

Wolverhampton.—St. Paul's Church, Wolverhampton, was re-opened on Whit Sunday, considerable alterations and improvements having been made to commemorate the fiftieth anniversary of its foundation. The old high-framed pews have been removed, and replaced with handsome open seats in pitch-pine, with panelled bench ends and moulded cappings. The wood flooring of seats and the stone paving of aisles, &c., have been taken up and re-laid with new. At the east end of the chancel is erected a reredos of Late Decorated design, in Painswick stone and Derbyshire alabaster, and on the north and south walls of the chancel are fixed the tablets of Commandments, Creed, and Lord's Prayer. The whole of the interior has been painted and re-decorated. The ventilation and lighting are re-arranged, and a new hot-water apparatus provided. The reredos, the re-seating, and other builder's works, were contracted for by Messrs. J. & W. Cockerill, and the painting and decorating by Mr. M. Tatlow, both of Wolverhampton. The hot-water apparatus was supplied by Messrs. Jones & Attwood, of Stourbridge. The cost of the renovation is about 1,400*l.*, and the whole has been carried out from designs and under the superintendence of Mr. J. R. Veall, architect, of Wolverhampton.

Downe.—A new oak porch has been added to Downe Church, Kent, at a cost of about 100*l.*, by Mr. Balding, builder, of Bromley, from the designs and under the superintendence of Mr. St. Pierre Harris, architect, of 1, Basinghall-street, London.

The Incorporated Church Building Society.—The report of this Society for the year 1884 shows that the number of applications received for grants from the general fund was 105. Of these, 98 were granted, namely—30 towards building additional churches, 10 towards rebuilding existing churches, and 58 towards enlarging or increasing accommodation in existing churches by extension of walls, rearrangement of seats, and other improvements. The number of applications received for grants from the Mission Buildings Fund was 33. Grants were voted towards 28 mission churches, temporary churches, school churches, or hamlet chapels. The population of the 98 parishes and districts assisted is 312,706; the number of churches existing therein is 95, to which will now be added 30. The present provision of church room is 31,566, of which there are seats for the free use of the parishioners 24,954. To this provision of church room sittings will be added for 21,475; while the addition to the seats for the free use of the parishioners is 20,381. The general summary of the operations of the Society since its formation in 1818 shows that the total number of applications for aid was 8,959. The grants made were 7,393, namely, in aid of the erection of 1,963 additional churches and chapels, and of building, enlarging, or otherwise improving the accommodation of 5,430 existing churches and chapels.

New Board School.—On Monday Mr. Benjamin S. Olding, a member of the School Board for London, presided at the ceremony of opening a new Board School in Scawfell-street, Great Cambridge-street, Haggerston, the centre of a densely-populated district. The new schools are built from designs by Mr. E. R. Robson, to accommodate 1,193 children, and a large number of local interests had to be bought up to procure the site, which, with legal expenses, cost 13,480*l.* The buildings cost 11,464*l.*, being an expenditure of 9*l.* 12*s.* 3*d.* per head per scholar.

The Student's Column.

DESCRIPTIVE GEOMETRY.—PART II.

II.

Classification of Surfaces.

MANY surfaces belong to no category whatever; others to two or three categories at once.

In the same category are placed the surfaces which have one mode of generation in common; such are, for instance, right cones, right cylinders, and surfaces of revolution.

The following are some of the principal categories of surfaces to be dealt with:—

Ruled surfaces are all surfaces engendered by the motion of a straight line; they are divided in developable and skew surfaces.

Developable surfaces are those which can be spread out on a plane after being cut along a generator; such are, for instance, cones and cylinders. The series of tangents to a helix,—that is, the thread of a screw,—are contained in a developable surface; it is called the developable helicoïd. It can be shown that the planes tangent to all developable surfaces are tangent along a generator just as in cylinders and cones.

Skew surfaces are not developable. The distinction lies therein that, in developable surfaces, two generators infinitely near are in the same plane, whereas in skew surfaces they are not.

The principal skew surfaces are:

The hyperboloïd engendered by a straight line as generator bound to meet in its motion three fixed straight lines as directors not contained in the same plane.

The paraboloïd is engendered as the hyperboloïd with the only difference that the three directors are parallel to a given plane.

The hyperboloïd of revolution is engendered by a straight line as generator revolving round an axis which is not in the same plane as itself.

Enveloping surfaces are engendered by the motion of a surface, such as S in fig. 93 called an enveloped surface.

If we consider two of these surfaces infinitely near to one another, we find an intersection, G; the surface is, therefore, formed by an infinite number of curves, G, as generators. In the case the envoloped surface is a sphere, the generator is a main circumference thereof. (See fig. 93).

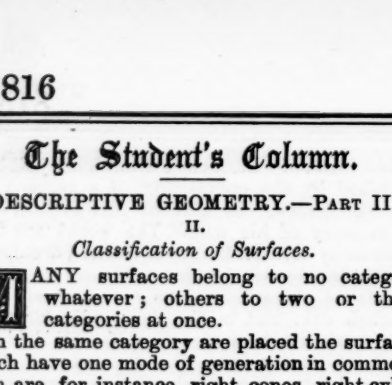


Fig. 93.

Surfaces of the second degree, so named because their algebraical representation involves equations of the second degree or quadratics, comprise the five following surfaces:—

1°. *Ellipsoïds.*

Let us make two ellipses *a*, *b*, *c*, *d*, and *e*, *b*, *f*, *d*, with their planes at right angles; if we

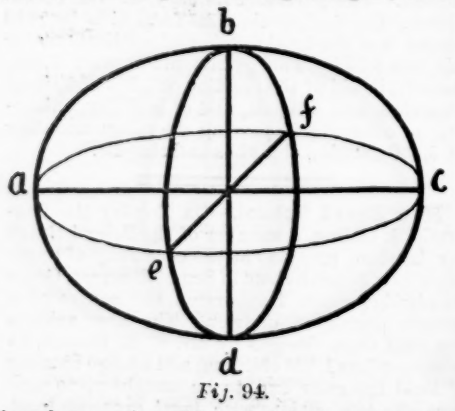


Fig. 94.

imagine a series of horizontal ellipses bound to have the extremities of their axes touching the fixed ellipses drawn, an ellipsoïd will have been generated. (See fig. 94.)

2°. *Hyperboloïd of two sheets.*

If we replace the two vertical directing ellipses by two hyperbolas, with their axes in common and their planes at right angles, the generating ellipses bound as before to have the extremities of their axes touching the directing hyperbola will generate the hyperboloïd of two sheets. (See fig. 95.)

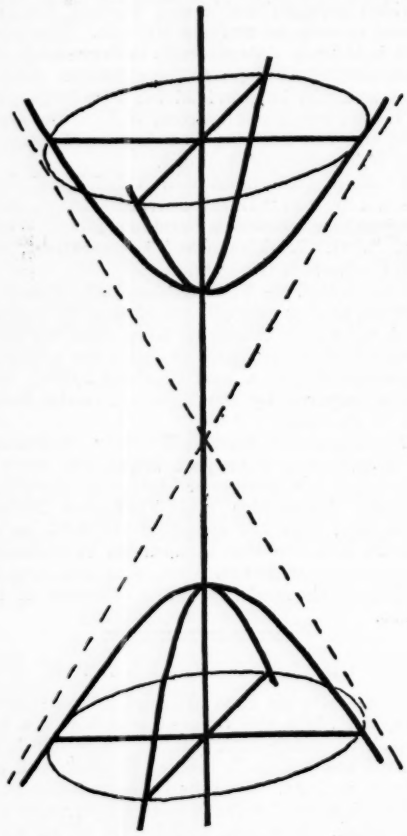


Fig. 95.

Note.—For persons unacquainted with conic sections we point out that an hyperbola is formed of two branches of infinite extent and of opposed directions.

3°. *Hyperboloïd of one sheet.*

If, on the other hand, the directing hyperbolas have their axes parallel to that of the generating ellipses, we get the hyperboloïd of one sheet. (See fig. 96.)

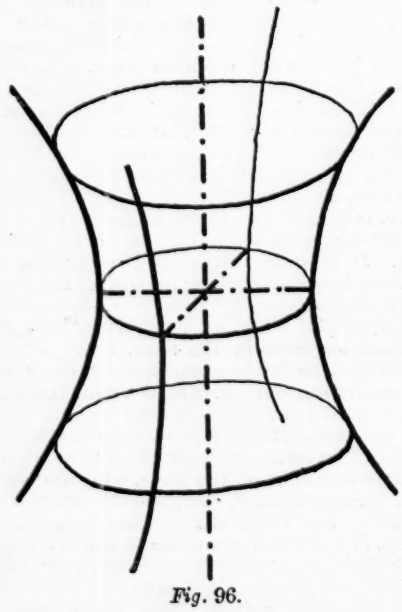


Fig. 96.

4°. *Paraboloïd.*

If the two directing lines be parabolas with the same axis, and their planes at right angles, then the genreating ellipses will produce the paraboloïd. (See fig. 97.)

In the four surfaces above described, if the directing lines are equal, the generating ellipsis becomes a circle, and the surfaces will be surfaces of revolution. The hyperboloïd of one sheet in this case can also be described by a right line revolving round an axis.

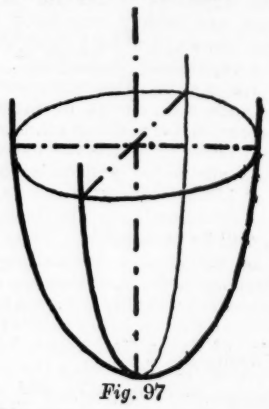


Fig. 97

5°. *Hyperbolic Paraboloïd.*

This surface is generated by two parabolas having their axes parallel and opposed in direction, their surfaces at right angles. One of the parabolas is fixed, the other moves along its outline with its plane always parallel. (See fig. 98.)

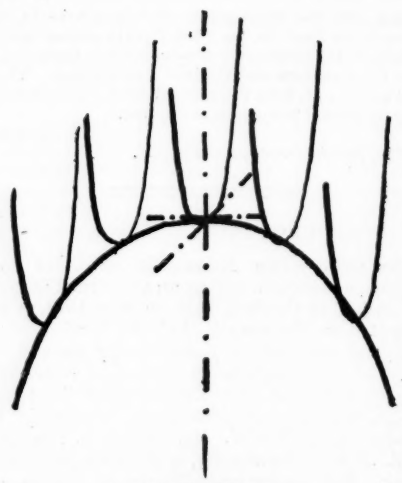


Fig. 98.

Of these surfaces, the second is never used for any practical purpose; the fourth is employed for reflecting mirrors. In building, the first surface has been employed for vaulting, but very rarely; the third and the fifth are the same as those we have called skew, and often occur in masonry.

Students who are not acquainted with conic sections may be puzzled by those definitions, but need not thereby be deterred from passing on to the practical applications, for they will find them quite within the grasp of any person accustomed to making working drawings.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

1,588. Locking Catch for Bolts, Window-fasteners, &c. J. Hummerston.

When the bolt is shot out it cannot be withdrawn until a small catch, actuated by a spring, be removed. The small bolt is inside, and independent of the main one, and by moving back the knob the small bolt is alone moved: this depresses the catch, and the knob then acting on the main bolt is able to withdraw it. In all cases the ordinary motion of the bolt or lever, although continuous, is in two parts, first removing the catch and then withdrawing the bolt or lever.

3,036. Chimney-pots. T. Anwyll.

The chimney-pot is formed with louvres and vertical radial partitions, arranged so as to form a number of equal flues. Currents of air striking against the louvres on one side are directed upwards, and are deflected laterally outward through the louvres by the partitions. This action is assisted by the closed top. The flues on the other side are meanwhile free for the egress of smoke.

3,927. Bench Hold-fast. W. Hayhurst.

The ordinary bent rod has a lever pivoted at its end. One end of the lever is provided with a hinged foot which presses on the work to be held, and the other with a cam or eccentric connected with a handle. The work is held or released by moving the handle.

14,482, Wood Planing Machine. J. Peirce.

In this machine the tables on each side of the cutter are on their lower surfaces provided with four inclined planes, which rest on four similar surfaces on a frame or slide. As the slide is movable by a

screw, the tables can be adjusted relatively to the cutter so as to regulate the depth of cut. The knives or blades of the cutter have two cutting edges, and are well bevelled off at the ends to fit into corresponding grooves in two collars, one of which is formed on the spindle, the other is loose and held up by a nut. Each blade is also held by a screw passing through its centre into a boss on the spindle, and the cutter is driven by a pulley situated between the nut and the loose collar above. The bearings of the spindle are lubricated by being connected with oil recesses in the supports. These oil recesses are fitted with caps screwed on so that the oil is under pressure.

APPLICATIONS FOR LETTERS PATENT.

May 22.—6,260, G. Barnard, Combination T-square, Set Square, and Improved Clamp.—6,273, B. Boothroyd, Apparatus for Ventilating Sewers and Drains.—6,291, W. Taylor, Improvements in School Desks and Seats.—6,294, M. Shearer and J. Smith, Brick Pressing and Moulding Machine.

May 23.—6,313, C. Clark and H. Coates, Apparatus for Lighting Gas by Electricity, applicable also for other purposes.—6,318, T. Birbeck, Improved Spindle for Door-knobs, and Method of attaching Knob to same.—6,319, J. & T. and S. Skinner, Bolts for Doors and other Fastenings.—6,326, B. Saunders, Safety Window Checks.—6,327, D. Rogers and D. Rogers, jun., Fire Grates for Domestic Purposes.—6,337, J. Harrower, an Improved Table.

May 26.—6,378, H. Buchan, Improvements in Water-closets.—6,407, T. Sutton, Portable Heating Apparatus.—6,412, H. Whiteley, Weather Guards, or Draught-preventers for Doors and Casement Windows, also applicable for Preventing the Slamming of same.—6,421, J. Small, Improvement in Extincteurs.—6,424, E. Harling, Wind and Weather Indicators, or Weather-cocks.—6,439, J. Ellis, Improved Construction of Metal Rib for Bridge Floorings, Columns, and other Constructive purposes.

May 27.—6,441, C. Foster, Improvements in Street Paving, and Manufacture of Blocks for same.—6,465, G. Haywood and G. Williams, Improvements in Ventilating Apparatus.

May 28.—6,507, A. Fongeadoire, Improved Safety Door Bolt.—6,510, J. Johnson, Improvements in the Manufacture of Decorated Glass.

PROVISIONAL SPECIFICATIONS ACCEPTED.

3,754, D. Faulds, Improved Coupling or Joint for Pipes, &c.—4,269, W. J. & W. F. Rowe, Improvements in Waste-preventing Cisterns.—4,630, R. Roberts, Apparatus for Opening Doors from the Inside.—4,993, T. Smith, Lighting Houses and other Structures by Electricity.—5,030, J. Simpson, Improvements in the Mechanism of Venetian Blinds.—5,060, H. Pearce, Opening and Closing Sashes, Fanlights, Skylights, &c.—5,278, B. Verity, Improved Warm-air Stove.—5,309, C. Maxsted, Door Closing or Check Apparatus.—5,437, A. Link, Preventing the Formation of Ice and other Atmospheric Precipitations upon Windows.—5,555, J. Jones, Folding and Adjustable Bench or Seat.—5,556, A. Clark, Improvements in Window Frames and Sashes.—5,635, M. Wallace, Combined Ventilating and Flap-Valve or Chimney Door for Kitcheners, &c.—5,427, J. Woodward, Reversing the Latch Bolts of Locks and Latches that the same may be used either handed.—5,774, S. Booth, Water-slide Gas Chandeliers or Gaseliers.—5,812, P. Brown, Improvements in Wire Fencing.—5,855, A. Clark, Machines for Sawing-off and Boring Wheel Felloes.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

10,564, E. Brown, Improvements in Spring Door Locks.—10,824, W. Burke, Machines for Cutting and Dressing Marble, Stone, &c.—11,549, W. Kent and J. Sutton, Improvements in Gaseliers and Apparatus connected therewith.—13,033, L. Dathis, Improvements in Bakers' Ovens.—13,991, H. Faija, Apparatus for Testing the Strength of Cement and other Substances.—14,611, J. Howard, Apparatus for Automatically Regulating the Closing of Doors, or for Preventing Noise or Slamming when closing.—4,801, R. Sayer, Improvements in Scavengers' Carts.—5,059, H. Haddan, Window Fastener or Stay.—5,112, J. Bonny, Connecting Fire Grates to the Flues of Chimneys.—10,876, J. Wilkinson, Improvements in Ball Castors.—13,412, F. West, Improved Adjustable Frame ascending and descending a Vertical Post, and specially applicable to Concrete Building.—15,816, A. Bickmore, Improvements in the Construction of Panelled Furniture, Doors, and similar Joinery.—5,193, H. Lake, Improvements in Sash-holders.—5,293, J. Adams, Semaphore Indicator for Electric Bells.

A New Temperance Hall for Kennington.—Mr. Arthur Pease, M.P., has promised to lay the foundation-stone of the new Temperance Mission Hall in Royal-road, Kennington Park, on this Saturday, June 6, at 4 p.m. Lady Brassey and Mrs. W. J. Armitage will also lay two tablet-stones on the same day. The architect of the building is Mr. Banister Fletcher.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

MAY 26.

By VENTOM, BULL, & COOPER.

Portman Estate—An improved ground-rent of 65*l.* 10s., term 10 years	£450
Marylebone—Ground-rents of 31*l.* a year, term 16 years	310

By WOODS & SNELLING.

Sidcup—The residence, "Springfield," term 88 years, ground-rent 10*l.*	610

MAY 27.

By H. S. HAWLEY & Co.

Bethnal-green—10 and 11, Parliament-street, 25 years, ground-rent 6*l.*	190

By W. WHITELEY.

St. John's Wood—24, Queen's-road, 51 years, ground-rent 12*l.* 19s. 9d.	870

By C. & H. WHITE.

Peckham-rye—Eleven plots of freehold land	4,085

By FULLER, MOON, & FULLER.

Norwood-hill—"Franklin House," and a plot of land, freehold	1,220
Carshalton, William-street—Two freehold cottages	180

By ROGERS, CHAPMAN, & THOMAS.

Margate—5 and 6, Ethelbert-crescent, freehold	3,470
Freehold stabling in Cliftonville-mews	335
43, 45, and 53, Ethelbert-road, freehold	1,920
44, Clifton-terrace, freehold	710
13, Trinity-square, freehold	510

By A. WALTON.

St. John's-wood—4, Coleridge-mews, 93 years, ground-rent 5*l.*	255

MAY 28.

By L. FARMER.

West Hampstead—The residence, "Braemar Lodge," 64 years, ground-rent 10*l.*	650

By JONES & SON.

Limehouse—48, 50, and 52, Farrance-street, 60 years, ground-rent 10*l.* 16s.	1,100
Ratcliff—9 and 11, Stepney-causeway, copyhold	515

By R. W. MANN.

Pimlico—276, Vauxhall Bridge-road, freehold	1,200
Marylebone—Improved ground-rent of 31*l.* 10s. a year, term 6¼ years	130
Viewsley, Middlesex—Copyhold house and 2 acres	490

By E. STIMSON.

Sydenham—32, Longton-grove, 66 years, ground-rent 8*l.* 7s.	750
Brixton—86 and 118, Stockwell Park-road, 57 years, ground-rent 7*l.* 8s. 4d.	760
125, Stockwell Park-road, 57 years, ground-rent 6*l.*	600
Ground-rent of 4*l.* 7s. a year, 57 years	60

By NEWSON & HARDING.

Whitechapel—24, Fieldgate-street, freehold	920
West Cowes—51 to 55, High-street, freehold	3,000
Mile End—208A and 210A, Jubilee-street, 63 years, ground-rent 18*l.*	960
Pentonville—28, Claremont-square, 27 years, ground-rent 4*l.*	500
Bloomsbury—37, 38, and 39, Museum-street, 55 years, ground-rent 120*l.*	2,030
40, 40A, and 41, Museum-street, 56½ years, ground-rent 146*l.*	1,745

MAY 29.

By H. C. NEWSON.

Beckenham—The residence, "Sunnyside," 78 years, ground-rent, 17*l.*	1,840
Limehouse—15, Three Colt-street, freehold	340
Woodford—5, St. Thomas Villas, freehold	300

By MADDOX & SON.

Oxford-street—No. 10, Poland-street, freehold	3,140

By ROBERT REID.

Islington—Improved ground-rent of 60*l.* a year, term 41 years	680
Improved ground-rent of 130*l.* 16s. a year, term 41 years	1,485
Oxford-street—Nos. 67, 69, 71, and 73; and 9, Soho-square, freehold	11,200
Harrow-row—8, Bridge-terrace, 54 years, ground-rent 12*l.*	880
10 to 13, Porteus-road, 50 years, ground-rent 65*l.*	1,575
6 and 8, Fulham-place, 52 years, ground-rent 10*l.*	1,270
33 and 35, Leamington-road, 71 years, ground-rent, 20*l.* 10s.	1,160
Southwark Bridge-road—Nos. 73 to 83 (odd), 33 years, ground-rent 140*l.*	1,880

By D. J. CHATTELL.

Clapham—Freehold ground-rents of 28*l.* 2s., reversion in 23 years	1,390
Freehold ground-rents of 33*l.* 18s., reversion in 23 years	1,460
Freehold ground-rents of 1*l.*, reversion in 13¾ years	1,200
Freehold ground-rents of 7*l.* 4s., reversion in 14½ years	390
Freehold ground-rents of 3*l.* 6s., reversion in 14½ years	180
Camberwell-green—Freehold ground-rents of 11*l.*, reversion in 6½ years	250

MEETINGS.

SATURDAY, JUNE 6.

Association of Public Sanitary Inspectors.—Second Annual Dinner, presided over by Mr. Edwin Chadwick, C.B., at the Holborn Restaurant. 6 p.m.

St. Paul's Ecclesiological Society.—Visit to Chaldon and Merstham: Papers by Mr. J. G. Waller, F.S.A., Major Heales, F.S.A., and Mr. W. Bolton. Train leaves Cannon-street at 2.17 p.m.

MONDAY, JUNE 8.

Royal Institute of British Architects.—Closing Meeting of the Session: Presentation of the Royal Gold Medal (to Dr. Schliemann) and other medals and prizes. 8 p.m.

Society of Antiquaries of Scotland.—Eight communications, including: "I. Notes regarding Cinerary Urns recently found near Uddingston, and now presented to the Museum by Mr. R. Thomson, architect, Glasgow." By Mr. J. Dalrymple Duncan, F.S.A. Scot., Hon. Sec. Glasgow Archæological Society. "II. Notice of the Excavation of a Chambered Cairn of the Stone Age, at Unstan, in the Loch of Stennis, Orkney." By Mr. Robert Stewart Clouston. "IV. Notice of Stone Circles in the Parish of Old Deer." By Rev. James Peter, F.S.A. Scot. "VIII. Notes of Excavation and Discoveries in the Tafts of Boyam, on Bastavoe, Island of Yell, Shetland, in 1833-35, &c." By Mr. J. T. Irvine, F.S.A. Scot. 3 p.m.

TUESDAY, JUNE 9.

London and Middlesex Archæological Society.—General Meeting at Tallow Chandlers' Hall. 1.30 p.m.

Birmingham Architectural Association.—Ordinary Meeting: Election of Officers. 7.30 p.m.

THURSDAY, JUNE 11.

Society for the Encouragement of the Fine Arts.—Third *conversazione*, in the Galleries of the Institute of Painters in Water-Colours. 8 p.m.

Society of Antiquaries.—8.30 p.m.

Miscellanea.

Useful Timbers of New South Wales.—According to the Immigration Agent for New South Wales, that colony abounds in useful timber. He says that for constructive purposes in dockyards, piers, bridges, house carpentry, coachmakers' and wheelwrights' work, railway building, fencing, and piles, nearly the whole of the *Myrtaceæ*, of which New South Wales possesses something like fifty varieties, are extremely valuable, and certain of them incomparably so. For the uses of the cabinet-maker and the house decorator, the timber familiarly known as the black-apple, the Moreton Bay pine, the red cedar, coach-wood, Clarence light yellow wood, turnip-wood, rose-wood, Illawarra mountain-ash, tulip-wood, myall, cypress-pine, and others, is capable of being worked up into furniture and panelling, beautiful in grain, rich in colour, and susceptible of a high polish. The timber of the prickly-leaved tie-tree (*Melaleuca styphelioides*) is said to be incapable of decay; that of the white ti-tree (*Melaleuca leucadendron*) is said to be imperishable underground; that of the turpentine-tree (*Syncarpia laurifolia*) resists the attacks of the *teredo navalis* in salt water; and that of the brush-bastard or white-box (*Tristania conferta*) has been known to preserve its soundness, when employed in building the ribs of a ship, for a period of thirty years. To the carver and wood-engraver the cork-wood (*Duboisia myoporoides*), the rose-wood (*Dysoxylon Frasernum*), and the pittosporum (*undulatum*) commend themselves as a serviceable substitute for European box; while the cooper finds in the native ash (*Flindersia Australis*), the silky oak (*Grevillea robusta*), the stave-wood (*Tarrietia actinodendron*), the green and silver wattle (*Acacia decurrens* and *Acacia dealbata*), and the swamp-oak (*Casuarina quadrivalvis*) excellent material for staves. Other kinds of timber are specially adapted for oars, spokes and naves, tool-handles, telegraph poles, and turners' work.

Continental School-Architecture.—Professor Vittanovich has recently contributed to the *Politecnico* of Milan some interesting details regarding the new elementary schools at Padua, built in 1880 by Signor Camillo Boito. He takes the opportunity of advocating the value of artistic excellence in the construction and furnishing of schools, maintaining that these points are of real importance as aids in education. This principle, it is remarked, has found acceptance in Switzerland, where school-architecture is regarded as being a subject of considerable moment, towns of 4,000 to 5,000 inhabitants spending on this object sums out of proportion to their geographical importance.

The Association of Public Sanitary Inspectors.—The second annual dinner of this Association will take place this Saturday, June 6th. The President, Mr. Edwin Chadwick, C.B., will preside. The following amongst other gentlemen have promised to attend, viz.:—Earl Fortescue, Dr. Alfred Carpenter, Dr. B. W. Richardson, F.R.S., Mr. James Beal, Mr. C. T. Kingzett, Mr. E. J. Watherston, and Mr. E. C. Robins.

Steel Cooking Utensils.—These, which are made of steel, and coated with pure tin, by Messrs. Perkins & Son, are said to be especially "sanitary" in character, and are in use, we understand, at the National School of Cookery. They obtained a medal at the Health Exhibition.

Society of Arts.—The Council of the Society of Arts have (with the approval of the President, H.R.H. the Prince of Wales) awarded the Albert Medal to Mr. Henry Doulton, "in recognition of the impulse given by him to artistic pottery in this country."

Wood Mantel-pieces.—Messrs. C. Hindley & Sons, of Oxford-street, send us an illustrated catalogue of their work in this class, showing a considerable variety of suitable and apparently by no means costly designs.

"The Future of the Working Classes." This was the title of a paper read at the recent Co-Operative Congress at Manchester, by Mr. E. O. Greening, of London. In the course of it he said:—"We say to a capitalist employer who earnestly desires to raise his workers, 'Copy the example of Godin of Guise; make your hired labourers into members of a co-operative republic of which you can become the proud and happy first president.' All competitive industry has been confessedly almost profitless for several years past; yet our established co-operative workshops have been steadily showing an average profit upon the capital they employ of nearly 20 per cent. per annum. The future of the worker, we believe, will be to work in societies which will practically be free states, of which they will be the citizens, owning their shares in the common property, voting for the Parliaments which will govern, and receiving a due proportion of the common results. These labour associations will be linked together in productive federations as our stores are linked together in distributive federations, and we hope that one common union will bind all to work together in reasonable harmony. How easily truly enlightened employers may convert their workshops into such social republics, and with what blessed results to themselves and all concerned, may be seen from the examples of Leclaire at Paris and Godin at Guise. The summary of the results at Guise of five years' working reads like a romance. Yet it is solid reality. If co-operators, trade unionists, and enlightened employers agree to will the social emancipation of the worker, the great work can be accomplished in our own time and the wasteful strife between employer and employed ended like a dream upon awakening. The prospect even now is full of hope and encouragement." Mr. Odgers (Manchester), Mr. Dockery (Leeds), and Mr. Miller (Glasgow) criticised the paper, Mr. Dockery stating that the future of the working classes would be what they choose to make it.

An Electrical Railway for San Francisco.—There will shortly be in operation in San Francisco an electrical railway, running from the Southern Pacific Depôt to the Union Ironworks at the Protrero. Experiments in this direction have been made for some time past by the Pacific Coast Electric Construction Company, which is now constructing the line. The road is similar to the San Francisco cable road, only instead of a cable underneath the track, there will be a negative and a positive wire. These, when brought together by the grip of the dummy, will complete the circuit and provide the motive power. When the car stops, the wires will be released; thus the power necessary to drive the car will be saved while it is at rest. The generating machines are also so arranged that, as soon as a car stops, they will cease to generate the amount of electricity to propel the car. Should the line become blocked from any cause, great saving will result. There is said to be no limit to the pace at which cars can be run by electricity, and experiments on the electric roads at present existing show that to propel a car conveying forty-four passengers costs only from 2d. to 2½d. for each mile run. It is stated that, should the experimental line prove a success, electricity as a motive power will be adopted on many of the tramways of San Francisco.—*Iron*.

Memorial to the Late Sir Henry Moncreiff.—A memorial mural tablet, erected by the congregation of Free St. Cuthbert's Church, Edinburgh, to the late Sir Henry Moncreiff, in the vestibule of the church, was unveiled by the Rev. Principal Brown, Moderator of the Free Church Assembly, on Saturday last. The tablet, which faces the front door, measures 5 ft. by 3 ft., and is of plain Sicilian marble. The design is Gothic. In an indented circle in the centre of the tablet a bust of statuary marble in full relief is placed. The tablet was designed by Mr. Hippolyte J. Blanc, architect, the Sicilian marble work was executed by Messrs. Johnston & Davidson, architectural sculptors; and the bust, which is a copy of one which stood in the Academy last session, was entrusted to Mr. John Hutchison, R.S.A., the general design being by Mr. Blanc. The total cost of the monument was about 100*l*.

Hospitals Association.—We are asked to mention that Mr. J. L. Clifford-Smith has resigned the office of Hon. Secretary of this Association.

More Archæological Discoveries at Roche Abbey.—The explorations of the ruins of Roche Abbey, which form part of the Scarborough estate, are still being pursued. The unearthing of a large quantity of pieces of coloured glass, supposed to have been parts of the large chancel window, has already been recorded. These pieces, together with a white glass cross, have been made into a window 3 ft. by 18 in. The cross forms the centre of the window, and is approached by a number of small steps formed in glass. The border is made of various colours, and is of irregular pattern. This was executed by a York firm, under the direction of the Hon. W. T. Orde-Powlett, who also takes great interest in the explorations. At the beginning of the present year he presented the window to Lady Scarborough, and it has since been fixed in the lobby of the chapel at Sandbeck. Through the advice of Mr. W. St. John Hope, of Derby, who visited the abbey at Easter, the base of the dining-room of the monastery has been discovered. This was found only a few inches below the surface adjoining the chapter-house. Several parts of the interior in both the north and the south chapels have been restored. Outside the east of the church two more layers of sarcophagi have been found, and it is proposed to further excavate the north corner of the ruins. Three of the large columns of the nave are exposed to view, and altogether the explorations are of a highly interesting character.—*Leeds Mercury*, *May* 30.

Proposed Indo-China Railway.—On the 27th ult. an address was delivered by Mr. Holt S. Hallett, to the Glasgow Chamber of Commerce, upon "Railway Extension to South-West China." After describing the country through which the railway would pass, Mr. Hallett proceeded:—"The length of the railway from Bangkok to Kiang-Hsen, allowing fully for the necessary windings and turnings through the passes, would not be more than 540 miles. The cost of its construction on the metre-gauge, including rolling stock, &c., could not exceed 4,000,000*l*. The branch line, which will join the main line at Raheng, will be about 160 miles long, half of the distance being in British territory, and the other half in Siam proper. The cost of the branch will not be more than 2,000,000*l*. sterling, one half of which would have to be guaranteed by the British Government, and the other half by the Siamese. Before leaving Bangkok I was assured by our Minister, Mr. Ernest Satow, that the construction of the railway wholly depended upon our Government, for he felt certain that if our Government would consent to guarantee the construction of the portion of the branch line from Maulmain to our frontier, the King of Siam would have the main line completed as far as Raheng, as well as the portion of the branch line connecting it with our frontier. The section from Raheng to Kiang-Hsen could be put in hand after the completion of the two lines which would form its base, and connect it with the seaports of Maulmain and Bangkok."

Fire at a Builder's.—During a great part of Sunday last a large contingent of the Metropolitan Fire Brigade was engaged in endeavouring to subdue a very serious fire which broke out between eight and nine o'clock in the morning, at the Crown Works, South Lambeth-road. The premises, occupied by Messrs. Higgs & Hill, builders, adjoined the Crown Swimming Baths, in Kennington Oval, and comprised, amongst several timber-sheds used as stores, many large stacks of timber. The following is the official report:—"Called to Crown Works, South Lambeth-road, S.W., to the premises of Messrs. Higgs & Hill, builders; cause unknown; contents and building insured in the North British and Mercantile, Commercial, Union, Royal, Westminster, Phœnix, and others; damage,—several stacks of timber and building material, covering an area of about 130 ft. by 130 ft., severely damaged by fire and water; and two timber-shed buildings used as store, one about 115 ft. by 12 ft. and the other about 55 ft. by 10 ft., and contents completely burnt out and fallen down."

Essex-street Chapel, Strand.—It is stated that Essex-street Chapel, the metropolitan head-quarters of the Unitarian body, is to be converted into "Essex Hall," at a cost of 22,300*l*. Sir J. C. Lawrence, Alderman W. Lawrence, and Mr. Edwin Lawrence, have contributed 6,000*l*. of the amount required. The building will be used in the same manner as the Memorial Hall is used by the Congregationalists.

A Church Burned Down.—St. Paul's Church, an ivy-clad structure, situated on a hill in the picturesque neighbourhood of Woodford Bridge, Essex, was on Monday totally destroyed by fire. No cause is assigned for the calamity, which seems to have originated in the Gallery.

Pinxton.—On Whit Monday two memorial-stones of a new Sunday school in connexion with the United Methodist Free Church were laid. The estimated cost of the building is 300*l*. The contractor for the brickwork is Mr. G. Goodall, of Pinxton, and for the woodwork thecontract has been let to Mr. R. Dennis.

Macclesfield.—Another three-light window, by Mayer & Co., of Munich, has just been erected in Prestbury parish church, Macclesfield. It represents the Good Samaritan, and is the third already executed by the same firm for this church.

COMPETITIONS AND CONTRACTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Dwellings for Labouring Classes	Liverpool Corporation	50*l*. and 25*l*.	August 1st	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Disinfecting Station	Chelsea Vestry.....	G. R. Strachan.....	June 9th	xiii.
Erection of a Wooden Building	Church Congress Missn	G. Rake	June 10th	xiv.
Painting and Whitewashing	Met. Asylums Board ...	*Official*	do.	ii.
Painting, &c.	War Department.....	do.	do.	ii.
Painting, Whitewashing, &c.....	St. Olave's Union.....	H. Saxon Snell & Son	June 11th	ii.
Granite and Gravel	Hendon Union R.S.A.	*Official*	do.	ii.
Ornamental Fence to Sea-Wall.....	Hove Commissioners ...	do.	June 12th	ii.
Cleaning, Painting, Works, and Repairs	Met. Asylums Board ...	do.	do.	ii.
Addition to Urinal, Lothbury	Commissionrs of Sewers	do.	do.	ii.
Artisan Dwellings, Dover		Street & Scholefield ...	June 13th	xiv.
Alterations and Additions to Premises, Wells, Somerset	Wilts and Dorset Banking Co. Lim....	G. M. Silley	do. June 15th	xiii. xiv.
Three Cottages, Peckham Rye	R. Martin	T. De Courcy Meade ...	do.	xiii.
Wrought-Iron Fencing, &c.	Hornsey Local Board...	*Official*	do.	ii.
Asphalte Pavement	Paddington Vestry.....	E. Monson, jun.	June 16th	xiv.
Boilers	Brentford Union	W. Bell	June 17th	ii.
New Passenger Station, Bishop Auckland ...	North Eastern Railway	*Official*	do.	xiv.
Well-Pumps, and Additions to Tank	West Ham Union	E. M. Bruce Vaughan	June 18th	ii.
Infirmary, Aberystwith	Trustees	*Official*	June 19th	ii.
Erection of Drill Shed, &c.	Admiralty	A. W. Conquest	June 20th	ii.
Granite, Kentish Rag, Flints, &c.	Folkestone Corporation	*Official*	June 22nd	ii.
Furniture and Fittings	London School Board...	J. R. Mann	do.	ii.
Cast-Iron Socket, &c., Pipes	East Cowes Local Brd.	A. & C. Harston	June 23rd	ii.
Shelter Roof	Met. Asylums Board ...	E. Monson, jun.	do.	xiv.
Erection of Shops	.....	*Official*	June 24th	xiv.
Engineer's Tools.....	Lewisham Union	do.	June 26th	ii.
Enlarging Newport (Mon.) Post-office	Com. of H.M. Works ...	do.	June 27th	xiii.
Making-up Roads	Finchley Local Board...	A. W. Parry.....	June 30th	xiv.
Floating Swimming-Bath	Reading Corporation ...	S. J. Newman	Not stated	ii.
Sunday-School Buildings, Northampton	.....			

TENDERS.

For mansion, stabling, &c., at Trosley Towers, Wrotham, for Sir Sydney Waterlow, bart., M.P. Mr. E. R. Robson, F.S.A., architect:—

	Building.	Add for Red Bricks.	Add for Chimney-pieces.
Holland & Hannen	£15,895	£80 0	£200 0 0
Punnett & Sons	15,722	30 14	260 2 0
E. Conder	15,135	33 0	195 0 0
Higgs & Hill	14,994	30 0	144 0 0
G. Shaw	14,965	75 0	185 0 0
T. Boyce	14,930	30 0	215 0 0
H. Lovatt	14,591	48 0	210 0 0
Wall Bros.	14,577	32 0	228 0 0
Mansfield & Sons	14,493	55 10	176 12 6
Lawrence & Sons	14,450	30 0	120 0 0
W. Oldrey	14,267	30 0	218 0 0
Shepherd	13,639	30 0	127 14 0

For new cattle-market at Nottingham, for the Corporation. Mr. Arthur Brown, Assoc. M. Inst. C.E., Borough Engineer:—

Contract No. 1: Abutments, Approaches to Bridge, General Formation, and Sewering and Levelling of Market.

J. & G. Tomlinson, Derby	£12,700 0 0
Meats Bros., Nottingham	11,500 0 0
Hodson & Son, Nottingham	11,287 0 0
H. Vickers, Nottingham	11,150 0 0
R. Holmes, Shirland, near Alfreton	10,997 0 0
S. Thumbs, Nottingham	10,789 0 0
T. Smart, Nottingham	10,232 0 0
Foster & Barry, Nottingham*	10,000 0 0

* Accepted.

Contract No. 2: Entrance Lodges, Offices, and Refreshment Rooms, Unloading Platform, Cattle-docks, Pig-sheds, Cattle-lairs, &c.

F. Wartnaby	£8,700 0 0
J. Hutchinson	8,234 0 0
Hodson & Sons	8,104 0 0
Foster & Barry	7,900 0 0
E. Hind	7,877 0 0
H. Vickers	7,778 0 0
J. J. Adams	7,738 0 0
G. Bell & Sons (accepted)	7,668 0 0
Bott & Wright	7,659 0 0
Wheatley & Maule	7,560 0 0
T. Guy	7,400 0 0

[All of Nottingham.]

Contract No. 3: Ironwork to Bridge, Roofs, Pens, Stalls, Railings, Hurdles, &c.

Handyside & Co., Derby	£6,675 0 0
White & Son, Nottingham	6,442 0 0
Braithwaite & Kirk, West Bromwich	6,268 0 0
T. Marshall & Co., Sandiacre, Notts.	6,452 0 0
G. R. Cowen & Co., Nottingham	6,028 0 0
Butterley Co., near Alfreton	5,896 0 0
J. Tildesley, Willenhall, Staffs.	5,880 0 0
Goddard & Massey, Nottingham	5,844 0 0
Abbott & Co., Newark	5,800 0 0
G. Fletcher, Wolverhampton	5,530 0 0
Newton Chambers & Co., Sheffield	5,451 0 0
B. C. & J. Keay, West Bromwich*	5,020 0 0
Brookes & Co., Wolverhampton, tender not complete.	
Haynes & Co., Nottingham, tender withdrawn.	

* Accepted.

[The amount of the three accepted tenders is 22,688*l*. The Borough Engineer's estimate was 25,425*l*.]

For intercepting sewer, penstocks, ventilating-shaft, &c., at Brighton and Hove:—

Hudson	£1,989 0 0
Oliver	1,750 0 0
Lockyer	1,735 0 0
Cheesman	1,684 0 0
Botterill	1,643 0 0
Harrison	1,525 0 0
Brooker	1,427 0 0
Peters	1,100 0 0
Longley (accepted)	1,088 0 0

For the erection of a Board School at Clive Vale, Hastings, including boundary-walls, desks, and all other fittings, for 220 infants, for the Hastings School Board. Quantities by the architects, Messrs. Elworthy & Son, St. Leonard's-on-Sea:—

D. C. Jones, Gloucester	£1,789 0 0
Tanner, Hastings	1,757 0 0
Phillips Bros., Hastings	1,745 0 0
Jenkins, St. Leonard's	1,700 0 0
Bridgeland, St. Leonard's	1,699 0 0
C. & E. Harman, Hastings	1,616 0 0
Eldridge & Cruttenden, St. Leonard's	1,615 0 0
Snow, Hastings	1,614 0 0
Cosens, Hastings	1,578 0 0
Hughes, St. Leonard's	1,557 10 0
Eldridge & Son, Hastings	1,542 5 0
H. Cruttenden, St. Leonard's	1,538 0 0
Rodds, St. Leonard's	1,495 0 0
Timewell, Hastings	1,490 0 0
T. Taylor, Hastings	1,473 0 0
Small, Hastings	1,456 0 0
Cooper, Hastings (accepted)	1,428 0 0

For additions to Thorneycroft, Christchurch-road, Bournemouth. Mr. H. Hardwicke Langston, architect, Great James-street, Bedford-row, London:—

C. A. D. George	£253 0 0
A. H. Stroud (accepted)	200 0 0

Accepted for reparations to walls of nave, and new roof to nave of the Church of St. Andrew, at Althorne, Essex. Mr. H. Hardwicke Langston, architect. First contract:—

C. Read	£337 10 0

Accepted for improvements and alterations to the chancel of the Church of St. Andrew, at Althorne, Essex:—

C. Read	£348 10 0

For repairs to Saxby Villas, Upton Park, Essex. Mr. H. Hardwicke Langston, architect:—

W. Jones	£100 14 6

Accepted for memorial stained-glass east window, in chancel of St. Andrew's Church, at Compton Dunden, Somerset. Mr. H. Hardwicke Langston, architect:—

G. W. Luxford	£100 0 0

For the erection of the Sailors' Home, adjoining the Custom-house, Gravesend, for the Directors of the Sailors' Home, Well-street and Dock-street, London. Mr. John Hudson, architect, 80, Leman-street, E. Quantities by Messrs. Franklin & Andrews:—

G. E. Weston, Wellclose-square	£7,044 0 0
W. H. Archer, Gravesend	6,762 0 0
T. Blake, Gravesend	6,750 0 0
T. Little, Whitechapel	6,727 0 0
W. Tuffee, Gravesend	6,688 0 0
S. Belham & Co., Buckingham Palace-road	6,591 0 0
Staines & Son, Great Eastern-street	6,572 0 0
Groome, Rowland, & Co., 17, Finsbury-pavement	6,500 0 0
Dove Bros., Islington	6,495 0 0
A. Doughty, 1, Southwark Bridge-road	6,333 0 0
J. H. Tarrant & Son, Sayer-street, New Kent-road	6,242 0 0
J. Angood, Stroud-green-road, N.	6,240 0 0
Kirk & Randall, Woolwich	6,130 0 0
J. Bentley, Waltham Abbey, Essex	6,122 0 0
Coulsell Bros., Bethnal-green	6,100 0 0
E. Procter, Woolwich	6,000 0 0
G. Parker, 124, Sumner-rd. Peckham	5,898 0 0
E. C. Howell, Palace-road, Lambeth	5,898 0 0
Priestley & Gurney, Hammersmith	5,814 0 0
J. & H. Cocks, Mile End-road	5,500 0 0
Kirk Bros., Addlestone, Surrey	5,379 0 0
W. Nightingale, Gravesend*	5,370 10 0

* Accepted.

For section 1 of alterations and additions to Headquarters of the First Sussex Artillery Volunteers, Brighton. Mr. W. Puttick, architect, Brighton:—

Reynolds, jun.	£389 15 0
Longley	374 0 0
Cheesman & Co.	365 0 0
Newnham	349 0 0
Cox & Sons	349 0 0
Carpenter	325 0 0
Wright (accepted)	314 0 0

[Architect's estimate, 365*l*.]

For making-up Mount View-road, Stroud-green, for the Hornsey Local Board. Mr. T. de Courcy Meade, engineer and surveyor:—

E. Heard, Hoxton	£1,800 0 0
Marshall, Brighton	1,798 0 0
F. A. Jackson & Sons, Stroud-green	1,495 0 0
Aspinall & Sons, Hoxton	1,460 0 0
Dunmore, Crouch End	1,433 0 0
Williamson, Green Lanes, N.	1,374 0 0
Adams, Moorgate-street	1,359 14 11
Pizzey, Wood-green	1,300 0 0
Mowlem & Co., Westminster	1,295 0 0
Nicholls, Wood-green	1,253 0 0
Alf. Walker, Upper Holloway*	1,127 3 0

* Accepted.

For alterations to the Nell Gwynne, King's-road, Chelsea, for Mr. Cowlin. Mr. H. I. Newton, architect, Queen Anne's-gate, Westminster:—

Gibbs & Flew	£355 0 0
Steel Bros., Victoria Works, Dalston*	285 0 0

* Accepted.

For the Punshon Memorial Wesleyan Chapel, Bournemouth. Mr. Robt. Curwen, architect. Quantities by Mr. J. S. Alder:—

For Excavation.

Lawson & Donkin	£279 0 0
J. McWilliam & Son	261 0 0
G. Perkins { six weeks	254 0 0
G. Perkins { two months	233 0 0
H. W. Jenkins & Son	240 0 0
Saunders & White	230 0 0
S. Minty (accepted)	215 10 0

[All of Bournemouth.]

For Building the whole.

Edward Smith	£9,172 8 3
C. A. D. George	9,000 0 0
S. Minty (error)	8,537 17 0
Lawson & Donkin	8,485 0 0
Geo. James	8,317 0 0
Hyam Cohen	8,275 12 6
Wm. White	8,241 10 0
G. Bevan	8,207 7 0
J. McWilliam & Son	8,067 0 0
D. C. Jones & Co.	7,980 0 0
Lucas & Cosser	7,950 4 3
Hoare Bros. & Walden	7,883 15 0
H. W. Jenkins & Sons	7,758 0 0
Harris & Wardropp	7,757 0 0
John Crook	7,205 0 0
E. Abley & Co.	7,195 0 0
E. C. Howell & Son (accepted)	7,115 0 0

For the construction of gas-works at the Schools and Workhouse at Mitcham, for the Guardians of the Poor of the Holborn Union. Messrs. H. Saxon Snell & Son, architects, 22, Southampton-buildings, London, W.C.:—

J. & F. May	£5,827 0 0
Willey & Co.	5,379 0 0
J. T. B. Porter & Co.	5,120 0 0
S. Cutler & Son	4,995 0 0
W. J. Fraser & Co.	4,976 0 0
T. Piggott & Co.	4,750 0 0
R. Dempster & Sons	4,630 0 0
W. C. Holmes & Co.	4,400 0 0
East Surrey Ironworks Co.	4,125 0 0
Ashmore, Benson, Pease, & Co.	4,049 0 0
R. & J. Dempster	3,100 0 0

For alterations and additions to Highfield, Fordingbridge, Hants, for the executors of the late Mr. J. R. Neave. Mr. Fred. Bath, architect, Salisbury—

Gilbert Harris, Salisbury	£2,435 0 0
W. J. & C. S. Young, Salisbury*	2,325 0 0

* Accepted.

For house and shop, in Beresford-square, Woolwich, for Mr. G. Lawrence. Mr. H. H. Church, architect, William-street, Woolwich:—

Cavil, Woolwich	£895 0 0
Brown, Plumstead	855 0 0
Coombs, Plumstead	850 0 0
Fenn, Woolwich	850 0 0
Procter, Woolwich	700 0 0
Lonergan Bros., Plumstead	683 0 0
Walker, Limehouse	656 0 0

For sundry works at Brown's Wharf, Poplar: building examination-room for patients, erecting high fences and gates, altering pavings, laying on gas and water services, &c., for the Managers of the Metropolitan Asylums District. Messrs. A. & C. Harston, architects, 15, Leadenhall-street. Quantities not supplied:—

Ward & Lamble	£595 0 0
S. Chafen	550 0 0
J. Holland	527 0 0
G. Limn	511 0 0
J. H. Johnson	493 0 0
E. Proctor, Wellington-street, Woolwich (accepted)	380 0 0

For three houses in Newman-street, Kettering, for Messrs. W. & N. Newman. Mr. H. A. Cooper, architect, Kettering. Quantities supplied by the architect:—

S. Bamford	£677 0 0
Dickens & Mutton	634 0 0
C. Sharman	600 0 0
S. Manby	585 0 0
T. Farey	578 0 0
A. Barlow	571 10 0
H. F. Henson	570 0 0
Henson Bros.	569 10 0
G. Henson	555 0 0
J. Bellamy (accepted)	433 0 0

For two houses in the Broadway, Kettering, for Mr. W. C. Cooke. Mr. H. A. Cooper, architect. Quantities supplied by the architect:—

Margetts & Neale	£680 0 0
C. Sharman	670 0 0
G. Henson	650 0 0
H. F. Henson	645 0 0
Dickens & Mutton	643 15 0
C. & F. Henson	629 10 0
T. Farey	626 0 0
S. Manby	623 0 0
S. Hulks	620 0 0
S. Bamford	600 10 0
F. Barlow (accepted)	600 0 0

For house in Milton-street, Kettering, for Mr. Wm. Ford. Mr. H. A. Cooper, architect. Quantities supplied by the architect:—

S. Bamford	£301 0 0
H. F. Henson	290 0 0
S. Manby	283 0 0
C. Sharman	270 0 0
Dickens & Mutton	270 0 0
A. Barlow	250 0 0
S. Hulks (accepted)	249 0 0

For two houses in Mill-road, Kettering, for Mr. Jno. Munn. Mr. H. A. Cooper, architect. Quantities supplied by the architect:—

S. Hulks	£520 0 0
C. Sharman	420 0 0
A. Barlow	415 0 0
H. F. Henson	411 0 0
C. & F. Henson	410 10 0
S. Manby	359 0 0
T. Farey	354 10 0
Dickens & Mutton (accepted)	352 0 0

For house in Hawthorn-road, Kettering, for Mr. Saml. Durrant. Mr. H. A. Cooper, architect. Quantities supplied by the architect:—

S. Hulks	£333 0 0
H. F. Henson	326 0 0
C. & F. Henson	318 10 0
C. Sharman	305 0 0
T. Farey	298 10 0
A. Barlow (accepted)	298 10 0

For additions, alterations, and repairs to No. 21, Bromley-common. Mr. St. Pierre Harris, architect and surveyor, Basinghall-street:—

Sykes & Son	£336 0 0
Taylor & Son (accepted)	295 0 0

For hotel at Bush Hill Park, Hadley Wood, for Mr. Charles Jack. Mr. Edwin T. Hall, F.R.I.B.A., architect, 57, Moorgate-street, E.C. Quantities by Messrs. Evans & Deacon, 1, Adelaide-street, S.W.:—

Marriott Bros.	£2,370 0 0
Longmire & Burge	2,300 0 0
E. Lawrence & Sons	2,283 0 0
P. Horseman & Co.	2,195 0 0
Turtle & Appleton	2,149 0 0
E. Toms	2,057 0 0
Foster & Dicksee (accepted)	2,055 0 0

For shops at Buch Hill Park, Hadley Wood, for Mr. Charles Jack. Mr. Edwin T. Hall, architect:—

Foster & Dicksee, Rugby (accepted)	£1,818 0 0

For stables and lodge at Ivy Hatch, Kent, for Mr. Charles G. Hale. Mr. Edwin T. Hall, architect:—

Punnett & Sons, Tonbridge (accepted)	£1,700 0 0

For roads and sewers, Bradbury Estate, Goose-green, S.E., for Mr. W. F. Morgan. Mr. Edwin T. Hall, surveyor to the estate:—

Blomfield	£614 0 0
Lloyd	557 0 0
Harris	539 0 0
C. Pearce (accepted)	507 0 0

For completion of three carcases, Bradbury Estate, Goose-green, for Mr. Morgan. Mr. Edwin T. Hall, architect to the estate:—

Baney	£880 0 0
F. Dawes	850 0 0
Robinson	800 0 0
C. Pearce (accepted)	753 0 0

For alterations and additions at Villiers-street, Strand, for Messrs. Chaplin & Co. Mr. Thos. W. Willis, architect, 34, Ely-place, Holborn. Quantities by Mr. C. Stanger, surveyor, 21, Finsbury-pavement, E.C.:—

		A.
Wall	£2,911	£202
Toten & Son	2,800	190
Laing	2,296	282
Patman & Fotheringham	2,273	425
King & Son	2,187	344
Williams & Co.	2,147	239
Ashby & Horner	2,137	240
Colls & Son	2,125	235
Patrick & Son	2,092	223
Jas. A. Taylor	2,020	185

A. Extra, if partitions in mahogany instead of deal.

For alterations at 21, Baker-street, W., for Messrs. Amery & Sons. Messrs. New & Son, architects:—

Thomas & Butland	£152 0 0
F. Mark	147 0 0
Drew & Cadman	98 0 0

For the erection of a six-roomed house, Prince's-road, Bermondsey, and repairs and alterations to the house adjoining, for Mr. W. Wilkins. Mr. E. Crosse, architect, Bermondsey-square:—

	New House.	Repairs.	Total.
B. Wells	£362	£77 10	£439 10
G. Patton	343	45 0	388 0
J. Wheeker	—	—	380 0
J. Almond	318	39 0	357 0
R. Russell	—	—	357 0
J. Bullers	—	—	335 0
A. White & Co.*	247	46 0	293 0

* Accepted.

For the erection of new stabling, coach-houses, and van-shed, at Liss, Hants, for Messrs. J. Mells & Son. Mr. E. Crosse, architect:—

W. Jenkins, Liss	£345 0 0
Finch Bros., Liss	293 0 0
S. Woodbourne, Liss (accepted)	251 19 3

For the erection of additional rooms, and alterations and repairs to Heath Villa, Hill-brow, East Liss, Hants, for Mr. W. S. Drayton. Mr. E. Crosse, architect:—

E. Carpenter, Liss	£489 14 6
Finch Bros., Liss	475 0 0
W. Jenkins, Liss*	340 0 0

* Accepted, with slight modification.

For alterations and additions to National Schools, Moulsham. Mr. C. Pertwee, architect:—

Potter & Lunnis	£1,123 10 0
W. Roper	1,047 0 0
Choat & Son	1,030 0 0
J. Baker	1,030 0 0
W. Fincham	1,024 0 0
Henry Gozzett	935 0 0
G. Saltmarsh	876 10 0
J. Moss	876 10 0
W. Wood	867 0 0
Compton & Fawkes (accepted)	864 0 0

For alterations and additions to Bushey Rectory, Herts, for the Rev. F. W. Kynaston. Mr. G. M. Hills, architect:—

Belham, Pimlico	£1,418 0 0
Hunt, Chiswick	1,082 0 0
Brown & Son, Harefield	1,020 0 0

For alterations and repairs to No. 182, Essex-road, Islington, for Mr. Merry:—

Heath	£124 0 0
Clinch & Patten	120 0 0
Stephens	117 0 0
Dearing & Sons (accepted)	113 10 0
Bayley	98 10 0

For erecting shops and houses on the New Writtle-street Estate, Chelmsford, Essex, for Count Roemer. Mr. Edgar Farman, architect:—

Henry Gozzett, Maldon	£6,150 0 0
Good Bros., Walthamstow	5,700 0 0
George Saltmarsh, Chelmsford	5,139 0 0
W. Roper, jun., Chelmsford	4,570 0 0
A. Moss, Chelmsford	4,497 0 0
W. Wood, Chelmsford	4,479 0 0

For rebuilding Nos. 7 and 8, Bury-court, E.C. Messrs. W. E. & F. Brown, architects, 6, Poultry, E.C.:—

F. Mark	£5,517 0 0
T. Boyce	5,316 0 0
J. H. Adamson & Son (too late)	5,213 0 0
Brown, Son, & Blomfield	5,072 0 0
F. & J. F. Wood	4,993 0 0
S. C. Parmenter	4,898 0 0
Lawrance & Sons	4,844 0 0
Colls & Sons	4,750 0 0
Brass & Son	4,666 0 0
J. Woodward	4,600 0 0
Kilby & Gayford	4,570 0 0
Stimpson & Co.	4,540 0 0

For kerbing, channelling, and tar-paving Brookshot-road, Brentford, for the Local Board. Mr. F. W. Lacey, A.M.I.C.E., surveyor:—

H. Spicer, Brentford	£491 16 0
S. H. Watkins & Co., Brentford	467 0 0
Thos. Brunsden & Co., Brentford	448 0 0
Nowell & Robson, Kensington	385 0 0
Mowlem & Co., Westminster*	377 0 0

[Surveyor's estimate, 390*l.*]
* Accepted.

For rebuilding The Huts, Wisley, Surrey, for Mr. James Moscrop. Mr. R. T. Elsam, architect, Hampton Wick, Middlesex. Quantities by the architect:—

Batchelor, Leatherhead	£2,799 0 0
J. H. Jarvis, Surbiton-hill	2,795 0 0
C. Bonell, Teddington	2,795 0 0
Watkins, Wisley	2,775 0 0
T. Hardy, Cowley	2,748 0 0
Oldridge & Sons, Norbiton	2,717 0 0
R. Wood, Cobham	2,621 15 0
T. Hiscock, Hounslow	2,500 0 0
J. Piller, Teddington	2,488 0 0
A. Newland, Cobham (accepted)	2,150 0 0

For alterations and additions to 63, Upper Gloucester-place, for Mr. J. F. Norton. Mr. F. H. Collins, architect:—

Stokes	£150 0 0
Head	130 10 0
Wetherilt, Lee, & Martin	114 17 0
Flowers	106 10 0

For the erection of a pair of houses at Tytherton-road, Holloway, for Mr. Thos. Lloyd. Mr. Geo. Waymouth, architect, 23, Moorgate-street:—

Thos. Hogben	£1,238 0 0
Taylor & Grist	1,215 0 0
Howe & White	1,080 0 0
Davis Bros. (accepted)	1,075 0 0

Havelock Arms Public-house, Gray's Inn-road.—By a printer's error in our last (p. 783), the tender submitted for building the above house by Messrs. Mattock Bros. was put at 2,288*l.* instead of 3,288*l.*

Shops and Stabling at Kilburn.—Messrs. John Allen & Sons, of Palmerston-road, Kilburn, write to say that their tender for this work should have been marked "withdrawn," as an item for shop-fronts had been omitted, value 100*l.*, making their tender 585*l.*, instead of 485*l.* The list was printed as sent.

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